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## Table of Contents.

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ORIGINAL ARTICLES— Page.

An Address, by H. DOUGLAS STEPHENS .. .. .. 465
Psychiatry in the Soviet Union, by REG. S. ELLERY, M.D. .. .. .. .. .. .. .. .. .. 470
The Analysis and Treatment of Static Foot Defects, by E. B. M. VANCE .. .. .. .. 476
Contracted Toes, by D. J. GLISSAN .. .. .. .. 479
On the Origin and Treatment of Syringomyelic Cavities, by LEONARD B. COX, M.D., B.S., M.R.C.P. .. .. .. .. .. .. .. .. 481
The Detection, Significance and Serological Treatment of Puerperal Sepsis due to the Clostridium Welchii (Puerperal Gas Gangrene), by CHARLES W. ADEY, M.D., B.S. .. .. .. 483
Pyelitis in Children, by EDGAR H. M. STEPHEN .. 485
Posterior Nasal Sinusitis, by CLIVE M. EADIE .. 487
Maternal Nutrition and Neonatal Deaths: A Comparison of the Neonatal Mortality Rates of Queensland and South Australia, by A. JEFFERIS TURNER, M.D., D.P.H. .. .. .. .. 490

REPORTS OF CASES—

Peritonitis in an Insane Patient, due to Perforation from a Foreign Body, without Symptoms till Half an Hour before Death, by P. BROWNE, M.B., and J. B. CLELAND, M.D. .. .. .. .. 493
An Unusual Case of Hæmoptysis, by A. M. WATKINS, M.B., B.S. .. .. .. .. .. .. 493

REVIEWS—

A Medical Pioneer of Victoria .. .. .. .. .. 493
Diabetes Mellitus and its Treatment .. .. .. 494
Eyestrain and Convergence .. .. .. .. .. 494
Orthopædic Surgery .. .. .. .. .. .. .. 494

LEADING ARTICLES—

The Diabetic Association .. .. .. .. .. .. 495

CURRENT COMMENT—

Vitamins and Cancer .. .. .. .. .. .. .. 496
Immunity in Protozoal Diseases .. .. .. .. 497

ABSTRACTS FROM CURRENT MEDICAL LITERATURE— Page.

Therapeutics .. .. .. .. .. .. .. .. .. 498
Neurology and Psychiatry .. .. .. .. .. .. 499

BRITISH MEDICAL ASSOCIATION NEWS—

Scientific .. .. .. .. .. .. .. .. .. .. 500
Nominations and Elections .. .. .. .. .. .. 506

POST-GRADUATE WORK—

The New South Wales Post-Graduate Committee in Medicine .. .. .. .. .. .. .. .. 506

THE ROYAL AUSTRALASIAN COLLEGE OF SURGEONS—

George Adlington Syme Research Scholar, 1938 .. 506

PUBLIC HEALTH—

Leprosy .. .. .. .. .. .. .. .. .. .. 507

CORRESPONDENCE—

The Payment of Medical Fees by Medical Practitioners .. .. .. .. .. .. .. .. 507
Tennis Elbow .. .. .. .. .. .. .. .. .. 507
Poliomyelitis in Twins .. .. .. .. .. .. 507

OBITUARY—

Archibald Jamieson Dunn .. .. .. .. .. .. 507

PROCEEDINGS OF THE AUSTRALIAN MEDICAL BOARDS—

Tasmania .. .. .. .. .. .. .. .. .. .. 507

BOOKS RECEIVED .. .. .. .. .. .. .. .. 508

DIARY FOR THE MONTH .. .. .. .. .. .. .. 508

MEDICAL APPOINTMENTS VACANT, ETC. .. .. .. 508

MEDICAL APPOINTMENTS: IMPORTANT NOTICE 508

EDITORIAL NOTICES .. .. .. .. .. .. .. .. 508


## An Address.[1]

By H. DOUGLAS STEPHENS,
*Melbourne.*

THE usual function of a presidential address in pædiatrics is to outline the advances that have taken place in that branch of medicine, and to make a broad survey of the field rather than a detailed examination of any corner of it. My intention, however, is to vary the usually accepted procedure and to present in more or less general terms an aspect of disease in infancy and childhood which has always intrigued me, namely, "acute abdominal conditions".

[1] The president's address read before the Section of Pædiatrics at the fifth session of the Australasian Medical Congress (British Medical Association), August, 1937.

The task of deciding whether a child who has developed abdominal symptoms, more or less suddenly, should be classed for treatment as a medical case or referred to the surgeon for operation is constantly arising and throws a heavy responsibility upon the medical attendant. This responsibility is undoubtedly increased in the case of young children. Early diagnosis is essential before toxæmia, shock and collapse dominate the picture. Except perhaps in the case of an intussusception, it is often quite impossible to come to an immediate decision when called early to a child with acute abdominal pain, and conservative measures should be instituted pending a further examination a few hours later.

Someone has said that Nature "loves to hide", and this statement appears to be particularly apt when one is confronted with some of the acute abdominal conditions of infants and children. Whereas much help is derived from an adult's

description of his complaint, the statements of children are often indefinite and frequently misleading, whilst in babies no statement of any kind is forthcoming and it is necessary to rely entirely on one's own observations, helped occasionally by the history obtained from parents or guardians. Abdominal pain and vomiting are the two symptoms which, singly or combined, go to make up an abdominal condition, and the suddenness of onset or the intensity of either indicates its acuteness or otherwise. Now it is well known that some infants and children, just as some adults, magnify these symptoms, whilst others either repress them or do not experience their effects so intensely. Hereditary influences, birth injuries and defective feeding loom largely in the causation of hyperemotionalism in infants, whilst in older children the baneful effects of "spoiling" or too great solicitude by parents, often themselves emotional to a degree, are superadded. Therefore, in estimating the intensity of pain and vomiting some investigation of the psychological make-up of the child is desirable, and an interview with both parents may prove exceedingly helpful in this respect. When investigating any acute abdominal condition in an infant or child the approach should be along methodical lines. Generally the chief symptom is pain, but vomiting is so often an accompanying feature that due regard must be paid to it. First of all one must try to ascertain whether the pain actually arises in the abdomen itself, and if not, where. If extra-abdominal causes of the pain can be excluded, then careful sifting of the various conditions which may give rise to acute pain within the abdomen should be carried out. This examination should endeavour to prove: (*a*) whether the pain is of simple nature, (*b*) whether it arises from inflammation of the peritoneum, or (*c*) whether obstruction of the bowel is inducing it.

The extraabdominal causes of acute abdominal pain are very few actually, and are chiefly medical. They are: acute pneumonia, acute follicular tonsillitis, acute pericarditis, acute poliomyelitis and gastric influenza. Although not strictly extra-abdominal, it is well to include in this classification acute pyelitis, or, more correctly, pyelonephritis, because its main characteristics are those of a general infection and the diagnosis is made on examination of the urine, a procedure which should never be omitted.

Undoubtedly the commonest and most confusing of these is "primary pneumonia" in infants and young children in the early stages of the disease. The muscle spasm and obvious tenderness over some part of the abdomen are the misleading features. These call for a careful assessment of the mode of onset and of intensity of the early symptoms. No physical signs except diminution of the vesicular murmur are to be elicited in the chest at this stage as a rule, but a radiogram will often settle the diagnosis. Much that has been said applies also to pleurisy and even acute pericarditis. Occasionally one has to operate on a patient with acute appendicitis occurring in the course of an acute pneumonia.

Acute tonsillitis appears in some way to be associated with abdominal pain, often of a colicky nature and situated in the right iliac fossa. If this combination is met with, suspicion should be fastened on the appendix. I have on several occasions opened the abdomen for right iliac pain in tonsillitis and removed an apparently normal appendix and seen no evidence of enlarged ileo-caecal glands. On the other hand, the frequency with which an acute, sometimes gangrenous, appendix is unexpectedly met with in almost similar circumstances in tonsillitis cannot be overemphasized. I have seen acute ileo-caecal adenitis in connexion with tonsillitis, but my experience would lead me to think that it is infrequent.

Acute poliomyelitis limited to the abdominal muscles is uncommon. The abdominal pain and hyperæsthesia, especially if associated with vomiting, as in one case seen by me, are very apt to cause confusion. The presence of an epidemic and the implication of the central nervous system with, in some cases, the early onset of paralysis removes any uncertainty. The pain and hyperæsthesia which occur before the onset of the rash in *herpes zoster* have been said to mimic an acute abdominal condition occasionally; but in the few cases I have seen this difficulty has not arisen.

It is hard to define exactly what is meant by gastric influenza, but occasionally epidemics of acute abdominal pain with repeated vomiting and frequent loose motions occur in children over four or five years of age during an epidemic of influenza. Such attacks suggest appendicitis and in my opinion often merge into it.

Not infrequently pyelitis commences suddenly with a convulsion or rigor, abdominal pain, vomiting and high fever. Confusion may arise as to whether pneumonia, meningitis or an acute abdominal catastrophe is imminent. A microscopic examination of the urine will settle the question.

If the cardio-respiratory system, as being the commonest extraabdominal source of pain, can be exonerated, the pain, especially if accompanied by nausea or vomiting, is probably of intraabdominal origin. In discussing this aspect of the subject, I shall not deal in any way with injury and its effects on the parietes or contents of the abdomen, nor with the results of hæmorrhage. Such possibilities, however, should be ever present in the mind of the physician or surgeon.

Consideration of acute intraabdominal conditions under the three headings already mentioned, though not strictly scientific, has proved of great practical value in the routine examination of these cases. Are the symptoms and signs consistent with: (*a*) irritation or inflammation of the mucous membrane of the alimentary canal, (*b*) inflammation of the peritoneum, or (*c*) obstruction of the bowel? Those cases coming under the first group generally are treated by medical means alone; the second group occasionally may be treated medically, but

more often require surgical aid; whilst the third group are almost entirely surgical.

In the first group we have to consider whether the pain is simple and due to indigestion from food upsets or to acute gastro-enteritis. In the average case of alimentary toxicosis abdominal pain is rare, tenderness on pressure is sometimes elicited in a general way, but cramp-like pains do occur in some cases. Similar pain is also present in intestinal obstruction, and often in the early stages of acute appendicitis (obstructive type). If it is of short duration, relieved by vomiting or defæcation, and if no rigidity or tenderness is detected between the spasms, acute indigestion is probable; but the child should be kept under observation, as it is common experience to have such patients returned some days later seriously ill. In referring to tenderness, it is of diagnostic value to bear in mind that colicky pain from any cause is eased by pressure, while inflammation brings out defence against pressure. Always inquire the nature of any material ingested and whether any medicines have been administered. Ask specifically if castor oil has been given.

Professor Rendle Short has stated that most abdominal pain in children is not due to some single indiscretion in diet at all, and the routine use of aperients in such cases kills hundreds of children every year in England. However this may be, the uncontrolled consumption of ice-cream in children in this country is responsible for a good deal of acute indigestion, and in many cases appendicitis. The prolonged use of arsenic in chorea and the unwitting ingestion of lead by infants and children through the agency of paint have induced severe cramp-like abdominal pains which are very puzzling until the cause is revealed.

Ordinary thread-worms (*Oxyuris vermicularis*) in small numbers rarely cause much abdominal pain unless situated in the appendix itself, where they set up what appears to be appendicular colic, in my experience a frequent precursor of acute appendicitis. The round worm (*Ascaris lumbricoides*) would seem, from a perusal of foreign literature, to be a much greater cause of abdominal pain and intestinal obstruction in children than experience in this country leads me to admit.

In an infant acute gastro-enteritis may begin abruptly with vomiting and colicky pains, rising temperature to 39·4° or 40·0° C. (103° or 104° F.); but diarrhœa of characteristic type followed by dehydration and prostration soon proclaim the diagnosis. Much more rarely than one would reasonably expect, intussusception may occur as a complication and introduce a very delicate diagnostic problem generally unravelled at autopsy.

One is often consulted about short sharp pains strictly located at the umbilicus in children from about four to eight or nine years of age. They have been called "umbilical" or "navel colic". The question uppermost in the minds of the parents is that of appendicitis, but rarely does one find any of the usual associated features of this complaint. If repeated small doses of aperients, such as rhubarb, senna, magnesia and such like, can be excluded, then one should investigate the possibility of epilepsy or allergy as ætiological factors.

Owing to the evanescent nature of the colicky seizures, one rarely sees the infant or child in an attack. They appear to me to be capable of classification into two groups. In one group the colic is short and sharp, lasting a moment or two, and may be accompanied by dropping of the head or staring, perhaps repeated several times during observation or examination. These are very suggestive of *petit mal* seizures. The other group have more severe attacks of umbilical pain, lasting several minutes to a couple of hours, sometimes accompanied by vomiting and diarrhœa. They are difficult to diagnose, but if followed by hives or other cutaneous manifestations, or by asthma, some food allergy should be suspected. There is rarely any tenderness to be made out in these cases and fever is absent.

Constipation is probably the commonest cause of mild abdominal pain, but occasionally, especially if aperients have been given, such pain may be very severe and comparable with that of obstruction of the bowel.

Typhoid fever may cause difficulty in diagnosis in the early stage on account of abdominal pain, occasional vomiting and some tenderness; or again at a later stage when perforation occurs in an ambulatory typhoid patient. In the classical types no such difficulty should arise; but on two occasions at least I have opened the abdomen on account of right iliac pain and tenderness, only to discover some enlarged mesenteric glands with thickening of Peyer's patches and dilatation of subperitoneal vessels over them. In another somewhat similar case a miliary sowing of fine tubercles near one of the congested areas indicated the real nature of the disease. Cholecystitis is so infrequent in children that it was my intention to mention it only.

Recently, however, my attention was called to a girl, aged six years, who, while recovering from typhoid fever in mild form, had an attack of cholecystitis. She became jaundiced, but the temperature subsided, the jaundice had disappeared in a week, and recovery was uninterrupted.

In 1921 I saw a girl aged six years, whom I had previously attended for the various ailments of early childhood. She appeared to be developing some acute abdominal condition requiring surgical aid, but the marked acetone odour of her breath suggested a further urinary examination and 4% sugar was found. The enterospasm, which this undoubtedly was, as none of the features of acute pancreatitis supervened, passed off and she has done well on insulin treatment ever since.

Such cases are rare in children, but teach the lesson that the urine should always be examined for sugar as well as for pus and blood.

Acute abdominal conditions in which vomiting is the predominant symptom are met with, and if obstruction somewhere in the alimentary tract can be excluded the trouble is often of a medical nature. Vomiting is so easily induced in infancy and childhood, whatever or wherever the disease, that its

presence is naturally expected in abdominal conditions. Persistent vomiting without pain at the onset of an illness, followed by pain in the muscles secondary to the vomiting, is suggestive of acidosis, a term which covers a multitude of sins. Findlay regards acidosis as comparable with fever, and neither should be regarded as a clinical entity. As acidosis is a disorder of metabolism induced by many diseases as well as starvation, our object should be to elicit the cause if possible; failing this, to treat the acidosis just as it is occasionally necessary to treat pyrexia of unknown origin. I have on many occasions found considerable difficulty in differentiating the vomiting of acidosis due to acute food intoxication from that due to obstruction of the bowels. The metabolic processes which determine an attack of acidosis are often inherited, the child himself being highly nervous and the subject of train or car sickness. His hepatic insufficiency is unable to stand the ingestion of many chocolates and ice-creams, or the excitement of parties, and vomiting is easily induced by febrile illnesses or infections of any kind, particularly of the tonsil and middle ear. Diarrhœa accompanying the ketosis rather favours an alimentary intoxication and should yield to the usual medical measures for combating the vomiting and dehydration. Unfortunately, appendicitis in the young child may set up a similar condition with or without diarrhœa and cause death before the diagnosis is even suspected. "Bilious attacks" is the expression commonly applied to attacks of vomiting in young children, and the fact that recovery has occurred on several occasions strengthens the assumption that they are not serious. A rude awakening sooner or later occurs when peritonitis dominates the picture and surgery often fails to effect a cure.

Other diseases, sometimes overshadowed by the vomiting in nervous children, are *otitis media*, tonsillitis and tuberculous meningitis, the last mentioned especially being very difficult to recognize in the early stages.

I have discussed, very superficially, those extra-abdominal conditions causing abdominal pain and vomiting, also those located within the abdomen and more or less amenable to medical treatment.

### Common Abdominal Disturbances Requiring Surgical Operation.

It now remains to review briefly some of the more common acute abdominal disturbances requiring surgical intervention for their relief. I shall deal first with those involving inflammation of the peritoneum, and secondly with obstruction of the bowels.

In the transactions of the Medico-Chirurgical Society of Edinburgh published last year, Sir Lancelot Barrington Ward read a paper on the diagnosis and treatment of acute abdominal conditions in children. For the purpose of that communication he had studied the abdominal emergencies in the Great Ormond Street Hospital for Sick Children, London, for the previous five years. It seemed to me that a survey on somewhat similar lines might prove interesting if carried out at the Children's Hospital, Melbourne.

I have been fortunate in securing the cooperation of Dr. Mildred Hutchings (registrar) and Dr. Alison Mackie in the compilation of these statistics, and am very grateful to them for their help.

The total number of abdominal emergencies is one thousand and two, and, as one would expect, acute appendicitis formed the majority, numbering 769 or 76·5% of all cases. These were all acute abdominal emergencies. Mild recurrent interval and subacute cases of appendicitis have been carefully excluded from the series. The mortality rate was 4·4%, and if five patients who were practically moribund on admission are excluded, the death rate is reduced to 3·7%. There were 144 cases of acute intussusception, or 14·5% of the total emergencies, with eighteen deaths, giving a mortality rate of 12·5%. For the first four years, 1931 to 1935, the death rate was 10%, but in the last year, 1935 to 1936, there were 34 cases with seven deaths, or a 20% mortality rate. The intestinal obstructions numbered 67, or 6·7% of the total, and the death rate was 41·8%. The remaining 2·5% of cases included primary peritonitis, Meckel's diverticulum, volvulus, ruptured pancreatic cyst, twisted ovarian cyst and other rarities.

From these statistics it will be seen that the two most common acute abdominal conditions necessitating laparotomy in early childhood are appendicitis and intussusception, the two together numbering 913 out of our total of 1,002 abdominal surgical emergencies at the Children's Hospital.

It is therefore obvious that early diagnosis in these two groups alone, which form 91% of all the abdominal emergencies, would materially reduce the mortality if prompt surgical intervention followed, for operation is generally well borne before shock and toxæmia supervene.

The combination of abdominal pain of any type associated with vomiting of any kind should render the appendix suspect. If these symptoms are accompanied by a coated tongue and offensive breath the abdomen should be palpated most methodically, with a view to eliciting differences of muscle tone on either side and the presence of tenderness. Should positive evidence of these be forthcoming, even in children under four years of age, and there be no features indicative of pneumonia, typhoid fever, pyelitis, or other medical conditions not requiring surgery, then an early appendiceal inflammation is almost certain to be present. So much importance do I attach to the presence of tenderness that its absence frequently indicates an extraabdominal lesion or else an abdominal disorder in which a surgical cause is unlikely. Should at operation an atypical intussusception be found instead of an inflamed appendix, or acutely inflamed ileo-caecal glands, or one of the many forms of intestinal obstruction, or even primary peritonitis, no regrets will ensue following operation and many tragedies will be averted.

Early diagnosis is the solution of the problem of the "acute surgical abdomen" from whatever cause. Recurring seizures of abdominal pain in infancy should not be regarded as "dietetic" until repeated physical examinations have been made and the

leucocytes have been counted. The usual order of events in acute appendicitis is epigastric or umbilical pain, vomiting occasionally, right iliac pain, tenderness and rigidity. Constipation is the rule, the tongue is coated, and the breath offensive. In pneumonic conditions, in acute pyelitis and in pneumococcal peritonitis the tongue is more often clean and red and the breath not offensive, whilst the temperature is 39·4° C. (103° F.) or more, occasionally with rigors and the pulse correspondingly raised. The temperature in the average case of early appendicitis is low, perhaps 37·8° C. (100° F.) and the pulse 96, and rigors are uncommon. Only careful investigation and keen appreciation of the significance of the physical signs will prevent an early case of pneumonia being diagnosed and treated as peritonitis, or a ureteric stone being mistaken for appendicitis. Classical types are easily recognized, but atypical cases are all too frequent, especially amongst infants and children, in whom a few hours' delay may make all the difference between an acutely inflamed appendix and a gangrenous one with local abscess or general peritonitis. When local tenderness can be elicited an accurate determination of its site is of the utmost importance when planning the operation. Sometimes the tenderness is high up near the right costal margin and suggests gall-bladder infection, a suggestion which is increased by the sallow tinge of the skin. Jaundice, however, is never present in my experience of these cases, but a maldescent of the caecum and high appendix are not infrequently found at operation.

A real retrocolic appendix, in contradistinction to one lying in the paracolic gutter, although quite common, often gives anomalous signs, especially in respect to pain, tenderness and rigidity. Diarrhœa may be present. This is one type in which difficulties in diagnosis may delay operation unduly, until perforation occurs and abscess permeates the cellular tissues extending up to the liver and diaphragm. A long appendix passing upwards lateral to the ascending colon is often indicated by tenderness in the loin. The pelvic appendix, like the retrocaecal type, often is difficult to diagnose on account of the obscure nature of the pain and tenderness. Pain on micturition is suggestive. Sometimes deep pressure over the pelvic brim will elicit tenderness, but such pressure in a young child will normally cause pain. Pelvic examination *per rectum* will often remove any doubts in this concealed form of acute appendicitis.

It is not my intention to consider further the subject of appendicitis, other than to state that early operation gives the best results and that operation at any stage is preferable to the Ochsner-Sherren method in infancy and young children.

Next to appendicitis the most common purely acute inflammatory conditions within the abdomen are primary peritonitis and ileo-caecal adenitis. So rarely does one see a gastric or duodenal ulcer in a child that these conditions will not receive further consideration.

Primary peritonitis includes pneumococcal, streptococcal and staphylococcal forms. Pneumococcal peritonitis is the commonest of these and offers a better prognosis as a rule than either of the others. Of thirteen cases in our series at the Children's Hospital, twelve were in females and one in a male, with five deaths. It generally occurs in girls and seems to commence in the lower part of the abdomen as a rule, though very virulent attacks are generalized from the start and seem in that respect to resemble the disease when it occurs in boys. In some cases a vaginal discharge is present from which the pneumococcus can be isolated; but this does not absolve the appendix as the cause of a peritonitis due to *Bacillus coli*.

If one could satisfactorily diagnose a pneumococcal peritonitis, operation would not be attempted until definite localization of the pus was assured. The possibility that a gangrenous appendix may be the cause of the peritonitis cannot be overlooked, hence surgery is the procedure usually adopted.

It is no uncommon sequence amongst infants and young children of both sexes for secondary pneumococcal peritonitis to follow acute nephritis or bronchopneumonia; but this is a terminal event and quite different in its onset from the acute primary types already mentioned.

Acute inflammation of the ileo-caecal glands is not infrequently mistaken for appendicitis. The differential diagnosis is difficult, however aware one may be of the possibilities. The general signs and symptoms are rarely so pronounced as in acute appendicitis. The adenitis may be either tuberculous or non-tuberculous.

If the condition is acute, operation is generally carried out and the appendix is removed, although macroscopic examination of it has seldom convinced me that it was an ætiological factor. It seems strange, if the appendix is the cause, why very enlarged ileo-caecal glands do not occur more often than they do in acute appendicitis. I believe that the activating trouble lies in the lower part of the ileum and that the acute non-tuberculous adenitis is comparable with the very enlarged ileo-caecal glands that occur so rapidly in acute ileo-colic intussusception. If the ileo-caecal adenitis is tuberculous, and I believe that in most instances it is, the cause probably does lie in the lower part of the ileum originally. It is rare to find any affection of the peritoneum. Should time admit of further investigations, X ray examination may help if calcification has occurred in some of the lymph glands. A positive response to the Mantoux test and a leucocyte count revealing no leucocytosis are significent of the presence of tuberculosis.

Before I leave the subject of acute intraabdominal inflammation mention should be made of three conditions which at times are difficult to diagnose. They are: (*a*) acute osteomyelitis of the iliac bone, (*b*) lymphadenitis of the iliac glands with abscess formation following a sore on the leg, and (*c*) osteomyelitis of the spine or hip, whether acute or

chronic. The limits of this paper will not permit their further consideration.

Easily the commonest form of acquired intestinal obstruction in childhood is intussusception; then follow acute obstruction from adhesions and bands congenital or acquired, volvulus, strangulated hernia and rare congenital anomalies.

The records of the Children's Hospital, Melbourne, show 144 cases of intussusception in five years, the age incidence being 82% under one year and the sex incidence 70% male. In typical cases the history of onset and the clinical features are pathognomonic of the condition.

Intussusceptions originating in the region of the ileo-caecal valve occur in nearly 90% of all cases. Of these, the ileo-colic type appears to cause more shock than the ileo-caecal; but the ileo-caecal forms a larger tumour in a shorter time, and may reach the rectum in the course of eight hours. The ileo-ileal or purely small intestine intussusception is rare and more difficult to diagnose than those just mentioned; consequently operation is often delayed until resection is rendered imperative. An intussusception of this type may not show blood-stained mucus in the stool for thirteen hours or more after the onset. The colo-colic or large intestine type is also rare, has a less dramatic onset, and may become chronic. In this type motions are passed, sometimes streaked with blood, and pain is occasional and not severe. Rapid wasting and the presence of a palpable tumour may cause the condition to be mistaken for *tabes mesenterica*.

Another common mistake is to confuse an acute enterocolitis with intussusception, especially in those infants with acute pain, vomiting, collapse and the presence of blood in the motions. There is generally fever, which is absent in intussusception, the motions contain some fæces with the blood-streaked mucus, but the blood is not bright and uniformly staining as it is in intussusception. A tumour is not felt in enterocolitis. In older children Henoch's purpura with extensive effusion of blood between the coats of the transverse colon closely simulates intussusception. Purpuric manifestations elsewhere generally point to the correct diagnosis.

Following intussusception the next most frequent cause of acute obstruction was the presence of adhesions or bands, acquired or congenital. In 34 children the strangulation or traction obstruction was sequential to operations for appendicitis with peritonitis, and in one case to tuberculous peritonitis without previous operation. In eight instances Meckel's diverticulum was the congenital factor inducing obstruction. Actually there were thirteen cases of Meckel's diverticulum. Intussusception was induced in three cases, five caused small bowel obstructions, three were found associated with appendicitis and were not pathological, one was the cause of very severe melena from a peptic ulcer at its base, and one discharged blood and fæces at the umbilicus.

Volvulus due to congenital malformation of the mesentery accounted for intestinal obstruction in six infants, all of them dying under one year of age. Of the six patients with volvulus, five died at or under fourteen weeks of age and were not operated upon, several being moribund on admission to hospital. All six were submitted to autopsy and showed rotation of a universal mesentery from one-half to three turns.

Curiously enough, only two patients with strangulated hernia were operated upon during the five years, one an inguinal and the other a femoral hernia. I personally know of many instances during that period of obstructed inguinal hernia in infants and young children relieved by elevation of the legs, foments to the affected part, and tincture of opium. Doubtless many of these herniæ would have become strangulated had the obstruction not been relieved early.

Of the other rarities inducing obstruction, duodenal stenosis and atresia occurred in four infants, all of whom died, whilst absence or stenosis of parts of the small bowel, microcolon and megacolon accounted for the remainder.

### Conclusion.

In conclusion, may I say that the privilege of occupying the presidential chair in this section of congress is an honour of which I am deeply sensible. If, from my now long experience in disease affecting infants and young children, I have been able to enunciate in this essentially clinical paper some principles which will be found helpful by family practitioners and specialists alike, this address will not have been in vain.

## PSYCHIATRY IN THE SOVIET UNION.

By Reg. S. Ellery, M.D. (Melbourne),

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Many foolish things have been said about Soviet Russia when ignorance and prejudice have conspired to damn. Sovietland has been painted in colours more lurid than those which lodged on Dante's palate, and has been anathematized by pious and patriotic people with an invective more vigorous than the fulminations of the Apocalypse. Likewise, and just as foolishly, has Lenin been lauded, and the Soviet *régime* has been praised as if it were perfection by those who have allowed the capitalistic discontents to pervert their judgements. The wise man will, therefore, endeavour to keep an open mind, condemning that which is pretentious, futile or misleading, yet not forgetting to praise those efforts which are honest and far-sighted and original in a people whose territory stretches over one-sixth of the earth's surface.

Now this is obvious to every unprejudiced visitor to Russia: the Russians are trying earnestly and honestly to build up a civilization which shall be better than that which existed before the revolution.

They are trying to educate and industrialize one hundred and sixty million people; to build a socialist republic on the ashes of a feudal empire. Theirs is no mystic ideal born of dialectics in the metaphysical moonshine of Marxist theorizing; it is a straight-out attempt to raise the cultural level of the people. It is a kind of religion which has gripped the minds of millions, making them like the children in the wilderness marching to the promised land. To the visitor their life may seem a contradiction: there is so much that is poor and shoddy, so much that is offensive to Western eyes. You will surely be impressed with the overcrowding and discomfort in the cities, with the low standard of living in the country. You may hate the flies and dirt and the ragged clothes; your class-consciousness may embarrass you; you may be annoyed when the clock in the Kremlin chimes "The International" at midnight; and you may stand aghast at churches turned into museums and radio stations; but always you must admit the sincere effort of these people to make things better than they were. You may be amused at their childishness; you must admire their determination. You may disagree with their ideas; you cannot discount their enthusiasm. Theirs is the faith that moves mountains.

So great has been the upheaval and so much still remains to be accomplished in the way of rehabilitation and the perpetration of the Soviet's reconstructive plan that Russia today is all things to all men. To those whose capitalistic prejudices have caused them to become blind to the virtues of communism, Russia will seem a shambles. Moscow and Leningrad will seem like Sodom and Gomorrah, cities of the plains visited by destruction. They will see the blistered paint and the broken window-panes, the decrepid trains, the torn pavements; and they will come away with their previous convictions of the evils of communism greatly strengthened. Yet those whose sympathies are with the communists will see behind the broken window-panes and the blistered paint and the half-completed schemes the ideals of a fervent people, a people wholly consumed in bringing their dreams to fruition, undeterred by hardship, undismayed by failure, happy in the belief that they are themselves building up a civilization superior to any that has gone before.

So liable is one to become infected with their spirit of enterprise that it is difficult to leave Russia unmoved or unbiased. This, however, is not the place to plead the virtues of communism nor yet to vaunt the superiority of capitalism. Whether the ageing axioms of capitalism, now rejuvenated by the fresh vigour of fascism, with its dictatorships and the piling up of armaments against national hatreds, is to be preferred to a classless society, which "takes from each according to his ability and gives to each according to his work", is a question which each of us is entitled to answer in his own way. But this need not prevent us from looking into the manner in which one hundred and sixty million people are combating the problem of mental health. Such an inquiry is bound to yield interesting results, irrespective of whether, in reconstructing its whole life on socialistic lines, the Soviet Union is preparing a rod for its own back or building an earthly paradise.

### Mental Disorder.

Mental illness in the Soviet Union is the same as in the western world; and by mental illness is meant every grade of mental ill-health, from the mildest tantrum of the child to the severest mental dilapidation necessitating custodial care. The Russians have their problems of schizophrenia and alcoholism and general paralysis just as we have, and they regard them in the same way. Senile and arteriosclerotic derangements, paranoid and epileptic psychoses, occupy similar places in Soviet as in other European statistics. They have mental defectives and problem children, criminals and delinquents, psychopaths and neurotics; but not all are treated as we should treat them.

There are no "certified" patients in Russia. Patients either go voluntarily to hospital or else they are, at the discretion of the doctor, taken in custody and kept until such time as they may be considered fit to be allowed in a voluntary hospital. The doctor is not called upon to fill in archaic legal forms; nor are the relatives compelled to sign degrading papers in which the patient is designated a "lunatic". There is no such person as the "Master-in-Equity" or the "Master-in-Lunacy", property being so much more simple an affair in Soviet Russia. The doctor or the patient's relative is appointed to act for the patient. The patient receives sick pay from his union during the whole of his illness, and this is sufficient to cover the needs of his family. Therefore there is little difficulty in persuading the patient to go to hospital for treatment in the very early stages of his illness.

This idea of getting the mental patient to go to the hospital voluntarily and at the very beginning of his illness is most important and is made easy for him on account of the money he receives, which removes his anxiety concerning the support of his family. In England it is gratifying to learn that in 1935, for instance, one patient in every four went voluntarily to the mental hospitals. No doubt a greater number would go if it were not for the necessity of staying at work, under the compulsion to earn money or in fear of losing a job, until the illness has progressed beyond the stage at which the patient can exercise his volition.

The mental hospital itself in Soviet Russia is much the same as in western countries. There are at present the same problems of overcrowding. Many of the buildings are makeshift: old houses converted into hospital blocks, walls knocked down to make dormitories, awaiting the time when men and money will be available for adequate new buildings. Most of the wards are "open". Barred windows scarcely exist. Nurses have charge in the male divisions, with orderlies to assist when necessary. In many of the mental hospitals day-

rooms, dining-rooms and recreation-rooms are common to both divisions, and male and female patients are allowed to mix freely when dining or playing indoor games. The proportion of doctors to patients, at least in the city and suburban hospitals, appears greater than in the majority of mental hospitals in England or here in Australia.

The Russian psychiatrists show no backwardness in the matter of mental treatment. Malaria, prolonged narcosis, "Sulfosin", "Pyrifer", prolonged baths, insulin hypoglycæmia, "Tryparsamide" and the various forms of endocrine therapy are used in the same way as in the European mental hospitals. In many institutions rat-bite fever is more favoured than malaria in the neurosyphilitic cases; and beneficial results have been claimed by its use in multiple sclerosis.

Occupational therapy takes a prominent place in Soviet mental hospitals, because the doctors are convinced of its healing powers. An interesting prophylactic measure in this connexion is now on trial. Special therapy workshops are set aside for the pre-psychotic, especially those of schizoid make-up, who show tendencies to introversion and seclusiveness. Such people coming under the notice of the factory superintendent, teacher or district psychiatrist, are encouraged to go voluntarily each day to work in these special shops, under the directions of a psychiatrist, who talks to them individually and directs their work in ways calculated to restore confidence and self-respect and make them more sociable. Naturally the ideals of communism are put strongly before them, and belief, once attained, may act with all the force of religious conviction. Many occupational clinics are rich in technical equipment and skilled instructors are not lacking. Full use is made of trained social workers, for the Russians have not been slow to recognize the forces of environment in the precipitation of mental disorders. Much attention is paid to the social life of the patient while in hospital. Visits from friends and relatives are encouraged, and everything possible is done to build up the patient's self-respect and to make his sojourn in hospital pleasant and home-like. This aspect of treatment is more in evidence than in many English and European mental hospitals.

### *Alcoholism.*

In Russia, alcoholism is still one of the major psychiatric problems. In any country the rôle played by alcohol in psychiatry is impressive. According to Forel:

> Experience shows that in all countries where the alcoholic habit reigns, it accounts for from one-half to three-fourths of the crime, a great share of suicides, of mental disorders, of deaths and diseases generally, of poverty, of vulgar depravity, of sexual excesses, of venereal disease and of dissolution of families.

The Soviet psychiatrists are aware of this and make very great efforts to handle the problem. They have instituted special reception wards for alcoholics, and treat them subsequently by a combination of psychotherapy and vocational training, endeavouring to fit them for an occupation worthy of a Soviet citizen. Many of the older patients relapse; but statistics show that the alcoholic problem is diminishing throughout the land. As one might expect, alcoholism is a problem affecting chiefly the older members of the community, men and women past middle life who are unable to adapt themselves successfully to Soviet life.

### *Mental Deficiency.*

Mental defectives are segregated in special schools, in colonies and sometimes in wards adjacent to mental institutions for adult psychiatric cases. All but the lower grade of defectives are placed under skilled instructors and taught to make what use they can of their limited mental faculties. The training ranges from simple routine work, simple organized games, to semi-skilled and skilled work for those who are capable. Striking results are often obtained in these feeble-minded patients, and not a few help materially in contributing to their own support.

### *The Gospel of Prevention.*

The perennial lament of British psychiatrists is that England spends ten million pounds a year taking care of its mentally afflicted and less than ten thousand pounds on research into the cause of such afflictions. How much may be spent directly on prevention is hard to estimate, because such efforts are highly sporadic, frequently misdirected and often dependent on private charity. In all the various health activities in England there is no coordinated scheme for mental prophylaxis. The Russians know no more about the ætiology and pathology of mental disorders than the English or other European races, but they are utilizing every scrap of their knowledge and the full force of their health and educational services in order to prevent them.

Prevention is the tocsin-call of the health services of Soviet Russia. The People's Commissar of Health has taken one of medicine's oldest maxims, "prevention is better than cure", and turned it into a living doctrine. The Russians know that mental health and bodily health are interdependent; that the one influences the other. They know this and spread the knowledge far and wide—in clinics, in consultation centres, through pamphlets, postcards, lectures and radio broadcasts. The whole population is taught the value of health. It is incorporated in their creed.

*The Institute for Neuropsychiatric Prophylaxis.*—In Moscow, Leningrad, Kharkov and a number of the other larger cities there are institutes for neuropsychiatric prophylaxis, each of which is the head coordinating centre for all the various departments of mental prophylaxis. Moscow, for instance, is divided into twenty districts; in each district there is a neuropsychiatric dispensary responsible for the mental health and well-being of about 40,000 people residing in the district. These dispensaries

work in the closest association with other health and educational agencies—factory clinics, crèches, schools, medical stations, consultation centres and the like; and they are all linked up through the main district centre with the chief institute. The medical officers in charge of the district neuropsychiatric dispensary have to become familiar with the clinical histories of all the psychotic, prepsychotic, unstable, neurotic, epileptic, alcoholic, delinquent and defective people in the district. Their destiny is in the hands of these officers, who prescribe treatment, custodial or curative, as the case may be. They instruct the people in the district by lectures and magazine articles and by personal consultation in the way of healthy living. They undertake vocational guidance. People come to them for advice in marriage, sex hygiene and contraception, in personality problems and in the maladjustments of childhood. These medical officers are responsible for the granting of sick leave and the sending away of such patients as may require rest to the convalescent homes in the south of Russia; and it is part of their duty to select cases for special workshops, where the work done is primarily curative and the workers are not required to work the standard hours or to reach a set quota.

It is well-nigh impossible to record in detail the work done in these district neuropsychiatric dispensaries. But too much emphasis cannot be placed upon the fact that these psychiatrists and their helpers are in the closest personal touch with the people in their homes and in the factories, so that they become aware not only of mental illness in its incipient stages, but of the environmental factors which go to the making of neurotics and psychopaths; so they are very often in a position to nip these troubles in the bud and to prevent the malignant flowering of much mental disorder. In this matter the Soviet workers have several distinct advantages: they work under a State policy by which the maintenance of health is regarded as being quite as important as the manufacture of tractors or as the building of factories; they have no vested interests to fight; they are not dependent on charity; they have no unemployment; they are not exploited, and the patients have at all times the feeling of economic security. It would be difficult to over-estimate the value of such advantages to the working out of a prophylactic programme.

It would be wrong to imagine that because the chief aim is prevention, research work is being overlooked. This is by no means so, as a perusal of the Soviet scientific journals will prove; and most of them are provided with summaries in French or German at the end of each article. In the Institute for Neuropsychiatric Prophylaxis in Moscow the research department is very active. There are numerous histologists, biological chemists and bacteriologists who are busily engaged in research problems; and the majority work many more hours each day than the set number which the State requires of them. In this same institute there is a large out-patient department, a speech training centre, and clinics for child and vocational guidance. Two small wards containing between 30 and 40 beds are attached to the institute and serve as an observation hospital.

It is truly amazing to see the amount of work this institute does, and how well it is done in the face of much inconvenience and many drawbacks. For the institute is no building of gleaming granite with wide corridors and spacious consulting rooms and laboratories fitted out like some Rockefeller research institute. It is entirely makeshift and ramshackle, being converted to its present use from an old home for aged nobility of the Czarist days; and the wards that form the observation hospital, though now as comfortable as many a private hospital in Western Europe, were once the stable where long ago Napoleon's horses were given shelter. Many clinics and laboratories, even in Moscow, are like this one; but this state of affairs is being rapidly rectified, and the Soviets themselves are justifiably proud of their new medical buildings and of the equipment, which is of their own manufacture.

*Medical Education.*—It is the aim of medical education in Soviet Russia to make students familiar with the prevailing ideas of mental prophylaxis, to teach them to recognize the incipient signs of mental disorders, the adverse environmental conditions in which mental illness is likely to flourish, and the mental mechanisms which form the background to many types of bodily illness. Naturally, under the present social system, from which economic competition has been eliminated, it is not difficult to find research workers and psychiatric social workers with adequate training; for the student receives his education free, is paid wages as a worker while he is studying, and is free to marry at any time he chooses because he is in a position to have a family. Free to marry, free from the sex taboos of western civilization and from the crippling financial anxieties of the average European student, the Soviet doctor and teacher graduate to their professions with a saner, more balanced outlook than their brothers and sisters under capitalism, and this is decidedly beneficial to those whose malleable minds they have to guide and instruct.

*Sterilization.*—Sterilization is not practised in the Soviet Union. Heredity is recognized as a variable factor—sometimes apparently great and at other times seemingly negligible—in the ætiology of mental disorders. While so much uncertainty exists as to the precise part which heredity plays, the Russians are turning most of their attention to post-natal, environmental and, they believe, preventible influences. If one could know exactly to what degree faulty habits of reaction in childhood are dependent upon innate factors and to what degree upon environmental factors, sterilization might have a stronger appeal. The Soviets, while agreeing that sterilization might be of decided value in individual cases, believe such a practice to be of little or no value in collective prophylaxis. They

realize, and I believe rightly, that compulsory sterilization alone would not prevent neurotics and other unstable people from propagating their kind; nor would it prevent those apparently normal persons who are the "carriers" of mental traits from having children and so passing on the taint, because it is at present almost impossible to isolate such "carriers". They consider that they can inculcate eugenic principles by education: that they can influence the opinion of the workers by lectures and posters to seek advice from the consultation centres, where ideas of inheritance are discussed and contraceptive methods are made known. They believe that having no family when the dangers of inheritance are made known should become a matter of good taste and should not need to be enforced by any form of compulsory mutilation. In a word, they believe that an enlightened race will tend to become a eugenic race. And who can say that such beliefs are wrong?

*Abortion.*—In the Soviet Union abortion is legalized in certain conditions only. It is never encouraged. In every clinic and consultation centre dealing with pregnant women there is propaganda discouraging abortion and emphasizing its dangers. In view of the proven harm of abortions, the Central Executive Committee and the Council of the People's Commissars of Soviet Russia last year decided to forbid "the performance of abortion both in hospitals and special health institutions, and in the homes of doctors and private homes of pregnant women. The performance of abortion shall be allowed exclusively in those cases when the continuation of pregnancy endangers the life or threatens serious injury to the health of the pregnant woman, and equally when a serious disease of the parents can be inherited, and only under hospital or maternity home conditions."

Such a law at once becomes an instrument for use in the service of mental prophylaxis. Certain British psychiatrists have pleaded for the legalization of abortion on economic grounds, realizing that a number of the children of the poor and the unemployed become liabilities rather than assets to a capitalist State. But in the Union of Soviet Socialist Republics the economic aspect is not a material factor. The Soviet law regarding abortion stands out in stark simplicity and eloquent sanity against our own legal ban on abortion, which Lenin rightly said reflects "the hypocrisy of the ruling classes".

*Prophylaxis in the Nursery.*—In the psychogenesis of practically all forms of mental disorder some character defect, some deviation of the social, scholastic or familial life will be found to have been present (although often overlooked) in childhood, because adult emotional problems arise within the structure of the personality at an age when the child is most susceptible to environmental influences. The Soviets know this and consequently they commence their prophylaxis in the nursery.

The health of children is undoubtedly one of the most important aspects of Soviet activities: "Little children are considered worthy of the best the State can bestow upon them at any cost." From the moment of birth (and even before birth in the antenatal clinics), therefore, physical and mental prophylaxis go hand in hand. The work of the consultation centres, railway station clinics, crèches, milk kitchens and nursery schools is well known outside Soviet Russia today, largely because teachers and pædiatrists from other countries have visited the Soviet Union at the invitation of the Soviet leaders. Some distorted views have gained currency regarding the efficacy of Soviet methods, and controversy has arisen over what is called the dissolution of family life when the crèche takes the place of the mother, who is probably working in a factory. But apart from the question of whether the average parents are best fitted to bring up children, time alone can decide whether the Soviet child gains more than it loses by the training it receives in the crèche and nursery school from the hands of those who have become specially qualified. For the Soviet workers believe, in the absence of knowledge as to how the child will solve its Œdipus problem in the crèche, that adult efficiency can be built only upon the intelligent handling of the child.

Education and health are inseparable in the Soviet Union. Play being the principal activity of the child until the age of seven years, social development, habit training, physical and mental growth and the establishment of normal behaviour patterns are effected largely through the proper direction of play activities. Certain types of children require special study on the part of the crèche and nursery workers, and their normal routine, therefore, includes research into problem children and the special selection of equipment and of play material, as well as the methods of approach. It is believed that in the home environment many children's minds are starved in ways that may lead to irritability, introspection and the development of antisocial tendencies, so that the nursery and kindergarten workers stress the need to arouse the child's curiosity by suitable and varied sense impressions and the envisagement of creativeness.

Many children are still reared in their own homes, which are visited by "patronage nurses", who instruct the parents in the elements of physical and mental health, giving advice on feeding, weaning, habit-training and recreation, and helping in the selection of toys and play material suitable to particular children. Mothers who elect to bring up their own children are encouraged to make use of consultation centres and crèches (and in country districts of the travelling crèches) in order to equip themselves better for their tasks. Short-time courses and permanent exhibitions and museums dealing with all aspects of child life and welfare are provided. Among the many aspects of infant welfare which are included in the lectures and discussions between teachers, medical men and parents, due attention is paid to the value of early training in daily routine, in proper child-parent relationships, in sex education, in rewards and punishments and

in other such important matters, the neglect of which can set up character deviations and emotional disturbances which in adult life may cause untold suffering, illness and inefficiency. Mothers frequently work in the crèches and nurseries themselves so as to gain practical experience of child problems. The crèche, in educating both mother and child, thus becomes a true centre of education and culture, and forms the strongest agent for mental prophylaxis in young children.

*The Pioneers' Palaces.*—The educational and health activities of the nursery are carried over into the school life as well; but in addition to the schools there are the pioneers' palaces. These institutions, of which there are now thirty-nine in Soviet Russia, are truly wonderful. They are enormous buildings in which there are a children's cinema, a lending and reference library and a small theatre; laboratories for chemistry, physics, botany and zoology; museums and aquariums; engineering and electrical workshops; studios for dancing, music, painting, sculpturing and photography; in fact, every variety of human activity is there in miniature. The equipment is lavish and surprisingly complete. Working models of tractors, motor cars, dynamos, locomotives and countless other mechanical devices; geological and botanical specimens; tools and technical devices; musical instruments and artist's materials fill the many rooms. An army of qualified instructors and assistants is there to help the children to understand and to use all these things. Children from the ages of seven to fourteen years are allowed to spend two afternoons a week in these palaces. They cannot at present be allowed to attend more often, because on account of their popularity the accommodation is strictly limited. But inside the palace the children are free to go where they wish; and they very quickly find which branch of activity has the strongest appeal. Here they find a medium for the expression of their interests and learn to master the arts or to handle tools and materials and become familiar with technical procedures. In learning to make and work their own models, paint their own pictures, dress their own dolls and stage their own plays, they develop creativeness which, with wealth of experience, promotes joyousness. And joyousness, the expression of a happily adjusted personality, is fundamental to the maintenance of mental health.

The children work under a supervision which is as kindly as it is unobtrusive. Guidance and observation go on side by side. Here the children learn the value of cooperation, which lays the foundation for their later collective activities as Soviet citizens. They are watched at work, and their capabilities, the type of work they choose, the manner in which it is carried out, the initiative and interest they display, and the way they overcome difficulties are noted, so that the individual characteristics of each child become known. Undesirable habits, antisocial trends, seclusiveness, shyness, jealousy, irritability and other emotional disturbances can often be remedied with very little difficulty; for the Soviet workers are convinced that what they do for the children will bear fruit in the citizens of tomorrow.

### Conclusion.

So the Soviet children grow to maturity. The toys of childhood are exchanged for the tools of adulthood. As young citizens they pass on to the factories, the technicums, the universities, or out to the collective farms, to the mines or to the army. But, wherever their inclinations and abilities take them, a wise health programme exists for their benefit, always with the same motto: prevention.

Nothing has been said about the protection of the child's physical health, which is certainly a tremendously important part of any scheme of mental prophylaxis. Nor would space permit even a short presentation of this subject, whose ramifications have become so vast in Soviet Russia. It must therefore be understood that the Soviet workers have attacked this problem, which is concerned with physical hygiene, ante-natal and post-natal care, immunization, pure food supply, recreation and the safeguarding of life and health in the dangerous trades, with perhaps even more vigour and originality than they have shown in the pursuit of purely psychiatric prophylaxis.

It is true that famine and other post-revolutionary disasters and privations have smitten the Soviet people, even as late as 1932, and taken a heavy toll of valuable lives and caused much suffering and hardship. But food shortage and rationing are things of the past, and I am convinced that it would be impossible now for any public health investigator to write such a scathing indictment of the Soviet Union as has been written on present-day England by McGonigle and Kirby in their book "Poverty and Public Health". In this they prove that in the midst of plenty a considerable proportion of the men, women and children have not enough to eat; that actual starvation is undermining the health of sections of the British population, causing physical unfitness, stunting growth, and increasing the death rate. The Soviet worker, whatever you may think of his politics, of his ideals and of the way in which he sets out to realize them, would never tolerate such a state of affairs. He may be anti-religious, heathen; he may shoot the counter-revolutionaries; but he takes the greatest care of his women and children. And in this he surely shows a wisdom and sentiment worthy of emulation.

It is the ambition of the Soviet Union to give the birthright of health to every child, irrespective of cost. I would make no claim that this ambition has been achieved. But I do say that the Soviet health policy is moving towards such achievement; that the energy directed to this ideal is sincere and vital; and that enough has already been accomplished to prove that its ultimate fulfilment is not an impossibility.

The civilized world is in a state of unstable equilibrium. Anything may happen at any time. The political situation in Europe is despairingly

complicated. I do not pretend to know; I cannot even imagine what the immediate outcome will be. But this I do know: that if the Soviet Union is allowed to continue its health plans it will be able to show an example to the rest of Europe which somehow or other the capitalist nations must either follow or ultimately perish.

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## THE ANALYSIS AND TREATMENT OF STATIC FOOT DEFECTS.[1]

By E. B. M. Vance,
*Sydney.*

To function perfectly, the weight-bearing foot, both in standing and walking, must maintain a symmetry with the lower leg. By symmetry I mean that it shall not be displaced too far outwards nor too far inwards in relationship to the leg in standing; nor must it suffer any restriction in its up-and-down lever-like action in walking. The postural faults to which it is prone are that it may go out of balance either from side to side or fore and aft. It should be kept in balance by its muscles. If it goes out of balance, one set of muscles becomes short and too strong, whilst their opponents become weak and too long.

The muscles of the foot have, in the process of evolution, had their actions reversed. The old moving parts of the ancestral limb-grabbing foot have in standing and walking become the fixed parts; and the muscles sweep upwards from the toes, which they used to move, to the leg which they now move. In this upward sweep, five of them—two on the outside and three on the inside—pass at the side of, and are attached to, the calcaneum by their tendon sheaths. By this attachment they are enabled to maintain the calcaneum in correct relationship to the lower leg. The calcaneum has naturally a slight slope outwards in relation to the lower leg. This slight slope makes it possible to take body weight without jar. But this slight outward slope of the calcaneum has to be counteracted by extra power in the invertor muscles. The invertor muscles are three in number to the two in number of the evertors, and in size and weight they are much stronger. In spite of this extra power, fatigue may impair their power and allow the heel to go out of balance, to capsize and to exaggerate the outward slope which it naturally has. Of the three invertors, please think for a moment of the *flexor longus hallucis* in particular. In its course from its attachment to the tip of the great toe upwards to its origin behind the fibula, it proceeds by way of a deep groove, directly under the *sustentaculum tali,* and then it almost tunnels its way through the side of the calcaneum and the back of the talus. These bony relationships give it a special importance in the task of keeping the heel well balanced. You will find it is a beautiful strong muscle, in keeping with its importance. Its full strength can only be exercised while the great toe retains a noble straightness. Once the great toe is deflected, it becomes unstable and loses its value as a fixed point. This lack of stability in the great toe robs the *flexor longus hallucis* of a deal of its power—that power which is necessary to maintain the balance of the heel. From this you may judge how great a sin it is against foot balance as a whole to wear shoes and socks which tend to push the great toe out of its straightness. The great majority of the static defects of the foot are caused in this way; that is, by the failure to maintain the full strength of the invertors. And the great majority of static foot defects are curable by giving the invertors some assistance in their task.

When the heel has everted it carries the whole foot with it; but gradually the forefoot, under the influence of the tibiales muscles, undergoes a compensatory torsion at the mid-tarsal joint. It is twisted inwards as a whole and upwards on its inner side—this because of overaction in an attempt to check the deficiency of the invertors. This flattens the inner longitudinal arch and presents the all-too-familiar flat foot picture.

There are other less common foot defects which contrast with this common one. These are structural rather than postural; they are faults of form rather than function. In these cases the foot is out of balance because of some intrinsic imperfection of the foot predisposing to deformity and rendering balance difficult to maintain. To this class belong the club foot and claw foot types. In vivid contrast to the flat foot, with its everted heel and inverted forefoot and flattened arch, is the claw foot, which presents just the opposite picture. It has an inverted heel, an everted forefoot and a high arch. These two, the *pes plano-valgus* and the *pes cavo-varus*—the first postural and physiological, the second structural and anatomical—are the two primary side-to-side faults of balance. The former is very common and the latter is relatively very uncommon. Thoroughly typical cases of each are frequenly seen, but here I must point out that, although it is possible to analyse foot defect into primary factors, any given individual case may present a blend of primary faults.

[1] Read at the fifth session of the Australasian Medical Congress (British Medical Association), August, 1937.

Club foot is typically a *pes equino-varus*; it is, of course, structural and not postural, and is a blend of side-to-side and fore-and-aft imperfections. I mention it, to say again, that any given case requiring foot correction may have in it a tinge of club foot fault. I mention it also to lead naturally to our inspection of the fore-and-aft imbalances. If the *tendo Achillis* is relatively too short, the whole foot will be carried into *pes equinus* position. If the *tendo Achillis* is too long, the forefoot will be carried into the deformity of dorsiflexion, of *pes calcaneus*. A shortness of the *tendo Achillis* may be an intrinsic natural fault or one acquired by prolonged recumbency or by the long-continued use of high heels. Apart from poliomyelitis or injury, *pes calcaneus* is seldom seen in an adult, but it is frequently found in the young child owing to malposition *in utero*. The fore-and-aft imbalances appear to you too simple; but if you detect them and plan your treatment to favour the weaker muscles, you will not be disappointed in the result.

### The Complications Due to Muscle Spasms.

When a foot has lost its balance its component joints are subjected to cross strain due to malalignment, and each becomes an irritated joint. Reflex muscle spasm is Nature's attempt to inhibit motion in such an injured joint. Continued muscle spasm begets muscle contracture. Uneven muscle contractures cause local deformity, and such deformities complicate the unbalanced foot. The disfigurements of splay foot, of *hallux valgus*, of *hallux malleus*, of clawed toes and many other such conditions, are frequently the very things which cause the symptoms. They produce the bursitis, the corns and the callosities, and treatment of them to be effective must be radical and based upon analysis of primary balance faults.

### Treatment.

I emphasize at the onset the high importance of prevention in these matters. The proportion of unpreventible troubles due to intrinsic foot faults is small. The vast majority originate from the footwear of civilization. Footwear includes both the stockings and the shoes, which are made on the toe formula of an anthropoid ape. They both commit the sin of deflecting the hallux out of that perfect alignment, without which there cannot be perfection of function. So the designing of "functional" footwear must be given first place. (In this, we, as orthopædic surgeons, would only be keeping up with modern architects, whose talk today is all of "functional" houses and of "functional" furniture.) Why is it that the followers of Saint Crispin, who is the patron saint of bootmakers, to whom we must look for the manufacture of our designs, are amongst God's most conservative creatures? If one of them should yield an inch he makes out he has conceded a mile. As for the hosiery, we need a right and a left stocking; or, better still, a stocking digitated, like the Japanese wear; or, at the very least, a square-toed stocking.

By a correct shoe I mean a shoe designed to give full room to the hallux—both at rest and at work—room enough in length, room enough in height, and room enough to ensure that there shall not be the slightest pressure of the shoe tending to force the great toe outwards. There must be in the design an effort to preserve that inner arch to which attention has been drawn; this means giving the shoe a curve, with the apex of the curve at the mid-tarsal joint. The heel, or counter, as it is technically called, should grip the heel of the wearer very firmly; viewed from behind it should look like the section of an old-fashioned razor. This is one of the hardest specifications to fulfil in machine-made shoes. The shank of the shoe should be wide. The shanks are made wide enough in men's and children's shoes, but not in women's.

Suffice now to point out our heavy responsibility to children in these matters. There is so much cartilage in a child's foot that it can be thrust into short and faulty shoes and stockings without causing any complaint of pain from the child. The fact is a child's foot may, and generally does, require, at some period of growth, a shoe a size larger every six weeks. Only rarely is this detected, and, if it is detected, only rarely can financial resources stand the strain of constant shoe buying. As for the stockings, if they are woollen, they fit when bought, though all but the very dearest kinds force the great toe outwards even when they are long enough; but with each subsequent washing they become shorter and shorter. The worst thing that I see in this is that it lays the foundation of bunions and everted feet; but the commonest thing, which is bad enough, is that the child, through the cramping of its toes, loses the habit and muscle sense of pressing the ends of the toes upon the ground at the end of each step. Once the toes go out of action the metatarsal heads become overused, and callosities under the metatarsal heads are formed from this local overuse.

There are occasions in the lives of both children and adults when it is desirable to assist Nature in her struggle to keep the hind foot from following its innate bent to capsize into pronation. These times are when weight is being rapidly acquired, such as in the growing period of youth, or in "middle-aged spread", or in pregnancy, or when weight is suddenly thrust upon one, as with infantrymen asked to take route marches carrying packs weighing from fifty to eighty pounds; or in the forms of occupation which demand prolonged standing, without interludes of walking, such as those of policemen, barbers *et cetera*. The method of giving this foot-aid is to wear a wedge on the inside of the heel, in addition to having the inswing curve in the shoe. For the great majority of feet it is equally important that this inswing should be in the shoes worn for the active games—shoes for tennis, football, cricket, running and dancing should have it. Only a bare 1% of people, namely, the intrinsically supinated hindfoot types, require any-

thing else. The regular inspection of school children's feet (and of the lower part of the back, the other site of slight failures to balance) by eyes trained to detect postural faults in their earliest stages would be a virtue in us which would be rewarded in time by a generation of people better poised, more at one with their surroundings and surpassing us in serenity.

Treatment by adjustments to the heels and soles of shoes is suitable for the minor degrees of static defects. Herein I am disposed, dangerously perhaps, to simplify methods of treatment by saying that the side-to-side imbalances are treated by wedges either on the inside or the outside according to the indications, and the fore-and-aft imbalances are treated either by metatarsal bars or by raised heels. But the more interesting developments come when treatment is required for the displaced hindfoot and the other compensatory forefoot torsions. Thus the orthopædic surgeon finds himself using on occasions an inside wedge on the heel and an outside wedge on the sole in cases of *pes plano-valgus*, and *vice versa* in cases of *pes cavo-varus*.

When dealing with the immature foot which has failed to form by natural processes an inner longitudinal arch of its own, such a condition being very liable to occur when the child has been overweight or undernourished or has walked late, I use, instead of the arch support so often resorted to both by the profession and the layman, a leather insole carrying a small rubber button placed in the centre of the inner arch, which acts like a cherry stone in the shoe just in the correct place to make it necessary to lift the arch by muscular action. There are cases in which I use inside wedges on both heel and sole to begin with, and later I discard the sole wedge, then later still I use a flapper along the outside of the sole; this is to encourage the formation or reformation of an arch. There are cases for the use of metatarsal pads gummed into the shoe, but they are not numerous, most of the metatarsal pains or callosities being secondary to either the *pes equinus* or the *pes valgus* fault, and they are correctible only by dealing radically with these faults. The number of shoe adjustments is not great, but the use and the combining of them to get the desired results are minor arts in themselves.

With the use of the correct shoe, *plus* adjustments designed to balance the foot better on the leg, goes the teaching of exercises, carried out as a lesson by the masseuse and done in greater part as homework. In the common *pes valgus* case the main task is to strengthen and shorten the invertors and to lengthen the peronei. The former can be done by exercises against resistance. When the toes have become deformed, for example, when they are contracted, but are not severely so, exercises concentrated on the toes, using flexors and extensors, interossei and lumbricals, are of great value. Manipulation, preferably under anæsthesia, has great curative value. The indications for its use are: (*a*) cases of general foot strain with minor defects, which has long been established; (*b*) cases in which on one side there is a restriction of one or more, but not all the movements of the foot (especially in the presence of a history of trauma); (*c*) in cases in which the capacity voluntarily to supinate the hindfoot has been lost it would be useless to attempt to treat these latter cases with appropriate wedges until more subastragaloid flexibility has been restored.

I mention here the use of the Thomas wrench for the correction of foot deformities. It finds its prime use in club-foot and claw-foot, but is also used to correct a valgus foot which has become too rigid for manual correction.

### *Plaster of Paris Correction.*

Corrective plaster of Paris splints have a well-established and fully defined place in the treatment of static foot defects. The task, for example, of shortening invertors and lengthening evertors in *pes valgus*; the task of lengthening a *tendo Achillis* which is short, but not too short, and broad and strong; and that of correcting both hindfoot (supination) and forefoot (pronation) faults in the *pes cavo-varus*; or that of correcting a moderate *hallux valgus*, can be well entrusted to plaster of Paris. Its application is no easy matter, but once it is on there should be no tears from the patient. I prefer for safety's sake to apply plaster of Paris splints without an anæsthetic, but if for any of the reasons which often crop up it is necessary to apply a plaster under an anæsthetic, the patient should be kept in hospital for twenty-four hours and very carefully watched for pressure or circulatory troubles. In the plaster the patient is allowed to walk, and in doing so acquires the new sense of what it is to have a better balance. In young children the effects are often strikingly beneficial. It is a common remark to hear that the child has been happier in plaster than it ever seemed before, that it used to be cross and irritable, but in the plaster it lost this fretfulness, and also that it had put on weight at a great pace. This is due to good balance having replaced bad balance. Plaster is not used in expectation of a complete reformation of foot postural defects as soon as it is taken off after three to six weeks. The thing is the acquisition of the new sense of better balance, then the preservation of the balance with correct shoes suitably adjusted and exercises, and perhaps the use of a night splint for correct posture during sleep. Such a procedure is sometimes demanded by the degree of the defect. It is occasionally chosen as a method of cutting down the time taken to correct the fault. For example, treatment by shoes and exercises alone may take two years to effect a restoration, whereas with plaster followed by shoes and exercises the time is cut down to eight months or thereabouts.

### *Subcutaneous Tenotomy.*

It remains only to speak now of the rôle of subcutaneous tenotomy in these defects. It is

fairly extensive. You know we owe our existence as a surgical specialty to Stromeyer's adventure of tenotomy of the *tendo Achillis* in 1839. This gave the art and science of correction of deformity such an impetus and opened up such startling vistas that "Orthopædia" has never ceased to progress and prosper. Only in congenital club-foot is the operation of *tendo Achillis* tenotomy likely to be called for in the correction of static foot defects today, but there is more frequent call for tenotomies of the plantar fascia in claw-foot and for tenotomies of the peronei in inveterate peroneal shortening accompanying flat-foot (*pes valgus*); for tenotomies of the extensors and the flexors of the toes in well-established claw-toe deformities in either the flat-foot (*pes valgus*) or the *pes equinus* defects.

The tenotomies round the base of the great toe are as follows: (*a*) tenotomy of the *extensor longus hallucis*, well up in its sheath in the dorsum of the foot for the *hallux malleus*; (*b*) tenotomy of the two tendons of the *flexor brevis hallucis* for *hallux rigidus*; (*c*) tenotomy of the conjoint tendon and the *extensor brevis hallucis* for *hallux valgus*. It is the all-too-frequent, though by no means general, unsatisfactory results of bone operations for *hallux valgus*, which retard foot-work from developing into a special branch as large and important as dentistry. Once this defect in our treatment is overcome we shall gain the complete confidence of the layman to deal surgically, if necessary, with his foot problems. Sixty-three operations known to me have been devised, extolled—and not often used. Those who entrust themselves to us will be undergoing more tenotomies in the future and fewer excisions of joints than they have had in the past. If the tenotomy in a very severe case gives insufficient correction, the orthopædic surgeon should osteotomize either the base of the phalanx or the neck of the metatarsal. What a sinister choice it is, that we excise the hallucial metatarso-phalangeal joint for a deflexion deformity! This is a procedure we should adopt in no other part of the body. Yet we use it in a joint which is the very *point d'appui* of our every step.

If the joint is irretrievably ruined, an excision is required—possibly! Yet even in that case I am bending a very inquiring eye to the satisfactory end results of Dr. Glissan's ankylosis in dorsiflexion, which is the sort of thing we do elsewhere in the body where stability is desirable.

A final word as to the real surgery of the grossly deformed foot. I admit to ankylosing the cuneiform metatarsal joint in an intractable *pes valgus*, with abduction of the forefoot. There are bony spurs here and there causing pain and worth removing. For the rest, the operation to take a foot to pieces and remould it into the desired shape is arthrodesis of the subastragaloid and mid-tarsal joints, with excision of suitable wedges to correct the deformities.

## CONTRACTED TOES.[1]

By D. J. Glissan,
*Sydney.*

Varying degrees of dorsal contracture at the metatarso-phalangeal joints, in association with plantar flexion at the first and sometimes at the distal interphalangeal articulations, constitute one of the most frequently encountered deformities affecting the human foot. The contractures may involve one toe only, as in the case of the classical hammer toe, or several or all including the hallux may be affected. There may be no associated subjective symptoms, or there may be a degree of disablement varying from slight to very severe.

Generalized contracture of the toes occurs in two forms: (*a*) a form secondary to other deformities of the foot, for example, *pes cavus*, *hallux valgus*, paralytic equinus, scar contractures following burns or wounds of the sole and dorsum, and injuries to the forefoot; (*b*) a primary form, to which I desire particularly to draw attention. This is not a rare deformity. It affects chiefly young adult males. It is bilateral and there is no associated foot deformity, or shortening of the *tendo Achillis*. I wish to stress this point, since I find the condition being referred to constantly as "claw-foot" or *pes cavus*. Each hallux is usually affected. In many cases no ætiological factor can be discovered, and it is possible that such cases represent a retrograde evolutionary process in response to the steadily diminishing use of the human lower limbs as locomotor organs. In a proportion of the cases, however, a definite causative factor can be traced. The condition is found as a late sequel to trench feet, as a result of acute infective arthritis at the metatarso-phalangeal joints, and in association with gonnorhœa.

In a typical case complaint is made of pain and callosities beneath the soles of the forefeet, of corns on the toes, of cramps in the legs and feet, and in cases in which gonnorhœal influence is present, of progressive thinning of the legs. Examination will disclose hyperextension at the metatarso-phalangeal joints, which may be corrected by passive manipulation, but not by the patient's active effort. In severe cases the deformity is quite irreducible, since the proximal phalanges have become subluxated on to the dorsum of each corresponding metatarsal head or neck. Across the dorsum of the forefoot the skin may be so tightly drawn as to cloak the vertical placement of the proximal phalanges and the shortened tendons, whilst in other cases the latter stand out tautly in bold relief. The middle phalanges are acutely flexed on the first, and the apex of each angle is capped by reddened, thickened skin or an actual callosity. There is usually no deformity at the distal joints. The little toes are usually much distorted and closely approximated to the neighbouring digits. The skin of the foresole

[1] Read at the fifth session of the Australasian Medical Congress (British Medical Association), August, 1937.

is overstretched and may be thin or much thickened; it may be occupied by one large calloused plaque or there may be a number of such patches, each opposite a metatarsal head. The latter can be palpated lying close upon the skin. The callosities are painful, whilst the tenderness is usually placed opposite a point just distal to the heads.

*Treatment.*

In the milder early cases, daily corrective exercises and manipulation of the toes, a corrective splint at night and metatarsal bars in roomy, flat-heeled shoes may stay the development of the deformity and keep the patient comfortable; but once the deformity is established radical operation offers the only chance of satisfactory and permanent relief.

*Operation.*

At operation no tourniquet is used. Through a 6·25 centimetre (two and a half inch) incision along the distal two-thirds of the first intermetatarsal space the tendon of *extensor brevis hallucis* is exposed and divided. The sheath of the *extensor longus hallucis* tendon is then approached and split and the tendon is delivered. A segment is removed from the latter and the sheath is then cut across. An incision is then made along the dorsum of the first metatarsal, crossing the joint on to the base of the first phalanx. This extends to the bone, and with a sharp periosteum elevator all the soft tissues are carefully and thoroughly lifted off each side of the metatarsal head and the base of the phalanx. This is a matter of some difficulty when the phalanx has been subluxated upon the dorsum of the metatarsal neck or head. The first phalanx is then gently but firmly levered into its normal relations with the metatarsal and forced into flexion.

Through the same incision the tendons, tendon sheaths and capsular and collateral ligaments controlling the second and third metarso-phalangeal joints are similarly dealt with.

A second incision is now made between the fourth and fifth metatarsals and the fourth joint is freed as already described; whilst in the case of the fifth joint, after the *extensor longus digitorum* tendon has been divided, the incision is extended along the inner side of the toe to the interphalangeal joint. Through this incision the first segment is filleted by subperiosteal removal of the proximal phalanx.

The next step is to carry out the ordinary procedure to secure correction at and fusion of the elements of the first interphalangeal joint of each of the inner three toes and the hallux. It is wise also to pare the cartilage carefully away from the contiguous surfaces in the case of the distal joints even when they are not deformed.

The skin edges of the two foot wounds are secured with dermal suture, and the cut edges of the dorsal expansions having been drawn together with catgut over the interphalangeal joints, the skin wounds on all the toes are closed, each with a few dermal sutures.

The method of splinting is important and is the subject of careful detail.

A small pair of snips and a piece of eighteen-gauge aluminium are sterilized with the instruments. Eight splints are cut, one for each hallux and the three inner toes of each foot. Each strip, of a width to fit the toe for which it is designed and long enough to extend from toe tip to well on to the sole, is then carefully moulded to the undersurface of the sole and its appropriate digit, whilst the latter is held in the corrected position at the interphalangeal and metatarso-phalangeal joints. Some difficulty is usually encountered in fitting the splints to the undersurfaces of the metatarso-phalangeal regions where the skin of the foresole has been greatly overstretched. In these cases the redundant skin comes to form a fold beneath the shafts of the first phalanges when the latter are brought into the flexed position. I am at present considering the feasibility of exercising a strip of this redundant skin in some cases.

The individual splints are then smoothly wrapped about with 2·5 centimetre (one inch) ribbon gauze soaked in *Tinctura Benzoini Composita* and secured to the toes and sole by an extension of the same medium. No other dressing is applied to the wounds or skin.

When they are in position a light plaster slab is moulded to the undersurface of the sole and the toes, the latter being held firmly in their new positions until the plaster has set. A small pad is now placed outside the gauze wrappings over the dorsum of the forefoot just short of the bases of the toes, and a light cast is applied to fix the slab in position. It includes the ankle, but stops short of the toes, which are then secured to the slab by several turns of a bandage over a pad of autoclaved felt. The little toe is carefully postured to ensure healing without deformity.

When the slab is properly applied the toes are held securely splinted and moulded in the corrected position, and need not be disturbed for six weeks. The ankle, however, is freed after a week or ten days. At the end of six weeks the plaster is removed and the gauze strips are unwound off the foot and toes, allowing the splints to be detached. Sutures are removed and the sites of the former interphalangeal joints are tested to make sure that ankylosis is becoming well established. The patient is then allowed to walk in slippers, with a pad of felt just proximal to the metatarsal heads. He is instructed to practise flexion at the metatarso-phalangeal joints, and within a very short time this movement develops to a marked degree in point of amplitude and strength. Ordinary walking activity is gradually resumed, but care has to be taken in the fitting of shoes, since the effect of the operation is to lengthen the toes and therefore the foot, and any tendency to cramp the toes must be carefully avoided.

The foot splint must be worn nightly for at least six months, in order to frustrate the contraction which is liable to follow the gradual resolution of the scar tissue which results from the extensive operative procedures on the dorsum of the foot.

# ON THE ORIGIN AND TREATMENT OF SYRINGOMYELIC CAVITIES.[1]

By LEONARD B. COX, M.D., B.S. (Melbourne), M.R.C.P. (Edinburgh),
*Melbourne.*

THE purpose of this paper is to consider the origin of syringomyelia and to examine such methods as exist for its treatment. It is proposed to consider briefly the following questions: the origin of the abnormal glial tissue, the relation of this tissue to tumour formations, the effects of irradiation with X rays upon the tissues, and the possibility of the surgical treatment of the cavities.

In the advanced case of syringomyelia, as seen in the autopsy room, it is usually found that the cord contains one or more areas of glial tissue, in which lie cavities. This abnormal area is found dorsal to the central canal of the cord and separate from it. Section of the cavity wall will show it to be composed of glia, in which the axes of the glial cells lie parallel to the plane of the cyst wall, if the cyst is much distended. This tissue usually stains weakly with the usual glial stains. Such an examination will throw little light upon the origin of this tissue, which possesses no distinctive attributes and resembles glial tissue as seen elsewhere. As the cavity itself lies apart from the remnants of the central canal and is not lined by ependyma, it cannot be unequivocally stated to be derived from this canal. Nevertheless, its situation in a neighbourhood where the embryonic canal has undergone obliteration in its dorsal part must render it suspect of being in some way related to this obliteration. However, its appearances rather suggest that it has resulted from a degenerative process occurring within an abnormal area of gliosis.

Such appearances do not in any way preclude the possibility that the gliosis could have been related to some developmental error. Indeed, it is known that other developmental deformities, such as *spina bifida*, occur not infrequently in association with syringomyelic cavities. Furthermore, syringomyelia is said to be often associated with one or more of the peculiar collection of congenital anomalies described by Bremer as the *status dysraphicus*, and familial cases have been observed.

The presence of cavities in similar positions in different parts of the one cord may also suggest a common error in development. Death in syringomyelia usually results from the effects of distension of the cavity. Occasionally, when death results from some other cause, it may be possible to examine the affected area at an early stage, prior to the alterations brought about by the accumulation of fluid within the cavity and the subsequent glial reaction. Such a case, in which developmental slits undistended by fluid existed, I have recently reported in *The Journal of Pathology and Bacteriology.*

[1] Read at the fifth session of the Australasian Medical Congress (British Medical Association), August, 1937.

**Case I.**

A woman, aged twenty-seven years, developed signs of disordered function of the spinal cord in no way resembling those usually associated with syringomyelia. These rapidly progressed, death ultimately occurring from pneumonia. At autopsy it was found that the upper part of the cord was almost entirely replaced by a large intramedullary tumour, an astrocytoma, containing many polar cells. Two well-formed slits were also present, one in the cervico-thoracic region of the cord, and one in the lumbo-sacral region. These were identical in appearance, macroscopically and histologically. In the segments which separated them the cord at first sight appeared to be normal. Later it was shown that even in this zone some disorder in the architecture of the dorsal region of the cord was present, of the nature of an excessive amount and distribution of glial tissue. Each of the two slits lay dorsal to and separated from the mass of ependymal cells which represented the obliterated central canal.

The slits were organoid in form and possessed a uniform architectural arrangement. An examination of their walls seemed to give a key to their origin; these were composed of polar cells set at right angles to the plane of the wall of the cavity. The cells were unquestionably of an astrocytic nature, for the processes contained large glial fibrils.

Such appearances could not fail to bring to mind such diagrams as illustrate the developing spinal cord. The idea has been expressed that syringomyelia results from simple malocclusion of portion of the developing central canal. The slits here observed could not possibly have been so derived. The embryonic central canal is a small structure, while the slits were many times this size. Nevertheless, the arrangement of the cells strongly resembled the arrangement of cells observed in the ependymal zone of the developing spinal cord. Here too lie elongated cells bounding a cavity. Furthermore, the cells of the slit wall were just of the type that one would expect to develop from the cells of the ependymal zone should they undergo independent maturity. It must also be remembered that this polar astrocyte closely resembles that type of polar cell present in the so-called "ependymoblastoma", the common tumour of ependymal origin.

I would therefore suggest that the walls of these slits had developed from the ependymal zone of the cord, and as they contained neither neurone nor oligodendroglia, they must have arisen at a stage when the progenitors of these elements had migrated. They were in fact types of heterotopia, in which portion of the ependymal zone of the developing cord had become isolated and undergone independent maturity.

What relation has such a structure to tumour formation? As each cavity present within the cord was many times the size of the normal developing canal, it is apparent that this ependymal rest had grown considerably. In the upper part of the cord lay a large astrocytoma related to the superior part of the upper cavity. This relationship was borne out by its histological appearances, for many of its cells were polar astrocytes identical in type with those present in the walls of the cavities. So it would seem as if slits and tumour had been derived from similar tissues; the former were of slower growth and organoid in form; the latter were of more rapid growth and had the appearances of a

neoplasm without any tendency to organoid formations.

It does not follow that all types of syringomyelia are to be considered as originating in just such a form as appeared in the cavities here described. An abnormal gliosis may arise from the same zone, form no organoid structure, and break down to form cavities. It is indeed possible that all grades of rapidity of growth exist, from an organoid structure or rest to a frank tumour. It is emphasized here, however, that syringomyelia probably does arise from the developing central canal of the cord in the process of occlusion of its dorsal part.

The transition of a slit as here described into a typical syringomyelic cavity may be readily envisaged. With the accumulation of fluid within its lumen the individual cells of its wall would be reorientated so that their long axes lay parallel to the plane of the wall of the cavity. A reactive proliferation of neuroglia would then follow, the ultimate picture being one of a dense gliosis surrounding a cavity.

Certain syringomyelic cavities, however, are lined by fibrous tissue rather than glia. Such an occurrence can be well imagined from the specimen described. At the outer margin of the wall was to be seen a zone of proliferating blood vessels and connective tissue. With gradual distension of the cavity the intervening glial zone might readily disappear, leaving a connective tissue wall in place of a glial wall.

It is possible that the glial tissue proliferation underlying the formation of syringomyelic cavities has malignant potentialities or may be actually malignant. In considering how this continuous growth may be arrested, we must consider the influence which the arresting agent may exert on a tissue which may be as slowly growing as a heterotopia or as rapidly growing as a glioblastoma. In practice a difference of opinion exists as to the effects of irradiation with X rays on syringomyelic cavities. Some authors believe that they have seen beneficial results; others deny that these occur. Such patients as I have had treated by irradiation have shown neither improvement nor arrest of their downward course. Moreover, the nature of the tissue to be irradiated offers little hope of any beneficial result. Most tissues of the nature of glioma or gliomatosis, as seen elsewhere in the nervous system, seem to be little affected by X radiation as at present applied.

As we know of no effective way of influencing the gliotic wall, we may perhaps more fruitfully turn our attention to the cavity. It is well known that many of the symptoms of this disease result from the remorseless accumulation of fluid within the cavity. Could this distension be relieved, benefit should result.

An operation for evacuation of this fluid has now been performed in a moderate number of cases in many countries. I am well aware that its results have been unfavourably commented upon. Furthermore, it has been suggested that the pressure within such a cavity is that of the cerebro-spinal fluid; therefore the relief of this pressure should not benefit the patient. However, Dr. Trumble has now performed this operation on two of my patients in whom the symptoms were rapidly progressing. In each case this advance stopped and some improvement resulted. That this improvement was only a matter of a few months in one patient will be discussed.

### Case II.

A man, aged twenty-seven years, was known to have had syringomyelia for several years. Even at the age of fifteen years he had developed a flaccid paralysis of both arms, from which he had recovered. In December, 1935, he was found to have a gross flaccid paresis of both shoulder and neck muscles, with a lesser paresis of the flexors of the forearm and of the hand muscles. Gross wasting and fibrillation of the affected muscles could be observed. The legs were fairly strong, but spastic, and with bilateral extensor responses. A dissociated anæsthesia was present over the second to the fifth cervical segments. His condition was rapidly progressive and he was given deep X ray therapy without benefit. By March, 1936, it was obvious that he would shortly be bedridden. He had little or no movement at the shoulder joints, his grip was extremely weak, and he walked with difficulty.

Dr. H. Trumble kindly performed laminectomy and found a cavity in the dorsal aspect of the cord, extending from the second to the sixth cervical segment. It was incised slightly to the left of the mid-line, and a quantity of fluid was evacuated. Its wall was smooth and its lumen was about the size of a pencil. Improvement commenced shortly after operation. Three months later the patient's right arm could be moderately powerfully abducted; his right hand grip had increased from 60 to 150 as measured by a dynamometer, and his left from 10 to 100. His walking was much improved. He could now occasionally appreciate pain over the analgesic area.

Nine months after the operation it was obvious that he was once more going downhill. One year after the first operation his condition was again desperate, and further exploration was decided upon. It was found that the meninges were adherent over the cavity, which was thus sealed. After being opened it was found to be even more distended than when first seen. An attempt was made by Dr. Trumble to establish permanent drainage between cavity and subarachnoid space by means of a rubber tube. After operation the progressive deterioration was arrested, but immediate improvement did not result as previously. However, four months after operation definite improvement was noted, and at present the patient's right hand grip is 140 and his walking is much improved.

The arrest of the course of the disease in this patient may be almost certainly said to have resulted from the evacuation of the cavity. The relapse and subsequent fresh clinical progress may be unequivocally stated to have resulted from the sealing up of the cavity and its redistension with fluid.

The immediate problem, then, would seem to be the devising of some means whereby this sealing up may be prevented or by which permanent drainage of the cavity may be ensured.

### Case III.

A young woman, aged twenty-three years, had been observed to be suffering from a spinal curvature for some years. In January, 1936, she stated that her left arm had been weak for one year and her left leg for six months. She had on occasions found to her surprise that her left hand had become painlessly burned.

She exhibited succulent swollen hands, pronounced kyphoscoliosis, absent arm reflexes and bilateral signs of pyramidal tract involvement. The power of her shoulder muscles was grossly impaired, that of her forearm and hand muscles less so. All movements of her legs were weak. An area of loss of pain and thermal sense was present from the second cervical to the second dorsal segment, the sensation of touch being intact. From this date she steadily became worse, despite deep X ray therapy.

In July, 1936, she was almost completely incapacitated, and exploration of the cavity was decided upon. This was undertaken by Dr. Trumble, the cavity being found to involve the segments corresponding to the area of sensory loss.

Her improvement was slow, but she gradually recovered a considerable amount of use in her arms. She has now not been examined for nearly a year, as she lives in the country, but she writes that she is very well and is able to use her arms much better. She can walk unaided, but is very nervous of doing so unless she knows that there is some supporting object handy.

The result of operation upon these two patients may be stated to have been temporary relief from the remorseless clinical progress of the disease, with some improvement. To what degree such relief may be prolonged must depend on such factors as the establishment of a means of escape for the fluid derived from the cyst wall and the control of the growth of the glia. The former may be left to our surgical colleagues to devise; the latter, to the radiologist or to whoever else can throw light upon the means of controlling abnormal tissue growth. Drainage should be useful in those cases in which the abnormal gliosis has little capacity to proliferate, but of less use in those in whom this tissue has a neoplastic trend.

There is also the problem of multiple cavities and those which exist within the bulb.

It would therefore seem wise to reserve operative treatment for the rapidly advancing case, in which this advance seems likely to have resulted from distension of the cavity rather than from glial overgrowth. The mild stationary case or that case in which the cord is in an advanced stage of disorganization is probably best left alone. I would, however, urge that the rapidly advancing case, in which cord disorganization is not too gross, should be given the chance of operation. In doing so, one may breathe the hope that some means may be devised to produce permanent drainage into the subarachnoid space or elsewhere.

## THE DETECTION, SIGNIFICANCE AND SEROLOGICAL TREATMENT OF PUERPERAL SEPSIS DUE TO THE CLOSTRIDIUM WELCHII (PUERPERAL GAS GANGRENE).[1]

By CHARLES W. ADEY, M.D., B.S.,
*Senior Medical Officer, Commonwealth Serum Laboratories.*

FORTY years have now elapsed since Dobbin, in *The Bulletin of the Johns Hopkins Hospital*, published an article entitled "Puerperal Sepsis due to Infection with the Bacillus Aerogenes Capsulatus". The *Bacillus aerogenes capsulatus* has since been given a number of other names, none of which can claim to be as elegant or as descriptive as the original. It is now known as the *Bacillus welchii* or by some authorities as the *Clostridium welchii*.

During the last ten years individual observers have reported whole series of these cases which they themselves have handled. One of the first and best accounts of such a series was published in THE MEDICAL JOURNAL OF AUSTRALIA of May, 1927, by three medical men of Adelaide, Rupert Magarey, J. Burton Cleland and J. G. Sleeman.[1] The title of their paper was "Gas Infections of the Uterus with Jaundice due to Bacillus welchii following Abortions". They reported seven cases, the diagnosis of which was regarded as certain, and six in which it was probable. At about the same time Brütt and Lehmann[2] reported a series of 14 cases, and in 1933 Heim[3] reported a series of ten cases. Finally, in April of last year, A. M. Hill[4] gave a complete account of puerperal and post-abortal gas gangrene. He gave details of 28 instances of infection by the *Clostridium welchii* which he had himself observed during two years at the Women's Hospital, Melbourne. Of these, 20 were associated with abortion and 8 with labour at or near term. This series is the largest yet published.

Since then this infection has continued to be observed. It is now recognized as a well-defined clinical entity. By that recognition we separate an important section from the group of multiform infections known as puerperal sepsis.

### Certain Characteristics of the Clostridium Welchii and of its Toxin.

The *Clostridium welchii* is an anaerobe. Nevertheless it will, in a favourable medium, proliferate in a test tube open to the air. Such a favourable medium is a veal broth to which a little meat has been added. The meat acts as a reducing agent, ensuring an anaerobic environment. When a little glucose and peptone are added to such a meat broth, the resultant medium is one in which the *Clostridium welchii* will proliferate with amazing rapidity; so rapidly, indeed, that in such a medium toxin may be demonstrable after growth for six hours.

Our own experiments have shown that toxin may be produced if the original concentration of hydrogen ions in that medium is within the wide range of from pH 7·3 to pH 9·0. It is improbable that minor variations beyond these figures would have a noticeable deterrent effect. It follows that a dead fœtus and the attached products of conception, *in utero*, constitute a pabulum which this organism may digest and on which it may proliferate and form toxin readily.

We at the laboratories extract the toxin from a culture of *Clostridium welchii* by filtration, and, as a routine procedure, we test that toxin by diluting it with normal saline solution and injecting it intravenously into mice. Mice which receive a

[1] Read at the fifth session of the Australasian Medical Congress (British Medical Association), August, 1937.

lethal dose collapse within a few hours. Some of them become convulsed. They die, usually within twenty-four hours.

One significant symptom these mice show within a few hours of their inoculation is hæmoglobinuria; they pass blood-stained urine. It is evident that the toxin possesses hæmolytic activity. This activity is demonstrable by other tests, such as the lysis of blood cells *in vitro*. We have never yet made a potent toxin which was not at the same time strongly hæmolytic.

As an alternative method of determining the potency of the toxin, one may dilute it and inject it intradermally into the shaven belly of a guinea-pig. Within forty-eight hours a necrosis will develop at the site of inoculation and, strangely enough, frequently also in the mid-line of the abdomen, the toxin having apparently run underneath the intervening tissue, which itself remains healthy. The injection of the toxin intramuscularly will cause a local necrosis.

It follows from the above that the toxin contains two elements or, at any rate, is possessed of two distinct activities: the one is hæmolytic; the other is necrotic when injected into living tissues, and is apparently of general lethal effect.

In a meat broth the *Clostridium welchii* will produce gas in quantity, even under pressure. By attaching a manometer to a test tube and hermetically sealing the system we have found the gas produced at such a pressure as to lift 40 centimetres of mercury (approximately seven pounds to the square inch).

The gas consists of carbon dioxide, carbon monoxide, oxygen and hydrogen. The mixture is highly inflammable.

### The Correlation of these Characteristics with Certain of the Pathological Changes Involved.

In the gravid woman infection by the *Clostridium welchii* is almost always initiated by manipulative interference with the course of a pregnancy. The fœtus dies and is retained in the uterus for a certain interval of time. The *Clostridium welchii*, introduced by the instrument, or by the fluid, or by the foreign body employed, is given an opportunity to proliferate and to form toxin.

The toxin thus produced may be absorbed into the maternal circulation and there cause the specific toxæmia. It will not as a rule endanger life while the organisms which produce it are unable to invade the muscular tissue of the uterus. At this stage, before such an invasion takes place, the complete extrusion of the products of conception will usually be followed by the disappearance of the toxæmia and by recovery.

Once the organism, perhaps favoured by trauma or by the necrotic effect of its own toxin, establishes itself in the muscular wall of the uterus, it initiates the menace of true gas gangrene. It forms gas. It causes gangrene by the pressure of that gas upon the blood vessels and by its own capacity for disintegrating soft tissues. Because of the disintegration of the walls of the vessels, blood is liberated. This blood is lysed by the toxin of the organism. Thus there is caused a hæmorrhagic, gangrenous necrosis of the muscle of the uterus itself. Before such an invasion has been long in progress, the organism may be cultivated at will from the circulating blood. A gross destruction of the red blood cells takes place. The liberated hæmoglobin takes part in the production of the jaundice and appears in the urine. There is evidence of peripheral circulatory failure, namely, low blood pressure, tachycardia and petechiæ.

The mind as a rule remains unclouded to the end. Apparently the toxin does not greatly irritate the human nervous system, although in the mouse convulsions occur.

There occur important changes in the kidneys. There is a widespread destruction of the epithelium of the convoluted tubules. Their lumina are blocked by debris. The secretion of urine is diminished. Uræmia may set in. These changes may be due to the direct action of the toxin or, instead, to the disintegration of hæmoglobin in the tubules. These renal changes are sometimes responsible for the late death of a patient whose acute infection has been successfully treated.

### The Serological Prophylaxis of Puerperal and Post-Abortal Gas Gangrene.

It is now possible to produce a concentrated antitoxin against the toxin of the *Clostridium welchii*. This antitoxin may be assayed in terms of international units by comparison with a standard antitoxin obtained from the Department of Biological Standards, National Institute of Research, London.

Now, when this antitoxin is used in treatment it favourably modifies the course of the disease. Dr. Hill considered it partly responsible for the ten recoveries in his series of twenty-eight instances of this infection. His article contains coloured illustrations of patients' serum. They show the diminution of hæmoglobinæmia which follows the administration of antitoxin.

Although intensive treatment—operative, serological, supporting and alkaline—is now known to be of value, the death rate is still formidable. When one considers that *Clostridium welchii* was actually cultivated from the blood in 19 of Hill's 28 cases, one realizes that the task required of the combined therapeutic agencies is a very severe one. Any evidence which bears upon prophylactic treatment is worthy of note.

While considering the implications of prophylactic treatment, we at the laboratories have carried out a number of experiments which bear directly upon the subject. It is well known that antitoxin will protect a laboratory animal against the effects of a subsequent injection of toxin. It can now be demonstrated that a very small quantity of antitoxin may inhibit the proliferation of an otherwise fatal dose of the living organisms. I should like to quote an experiment of our own.

**An emulsion of living *Clostridium welchii* is prepared as follows.**

The *Clostridium welchii* is allowed to proliferate for fifteen hours in a meat broth. The broth, which then constitutes a liquid culture, is drawn off the meat and is centrifuged. The supernatant fluid is removed. The organisms, being left, are washed by agitation with sterile saline solution. Centrifugation is again performed. The saline solution is in turn removed and is replaced by fresh saline solution. Thus one obtains an emulsion of living *Clostridium welchii* containing only traces of toxin. This emulsion is made up to approximately 4,000 million organisms per cubic centimetre.

Of this emulsion, 0·4 cubic centimetre is injected intramuscularly into the right thigh of each of 24 guinea-pigs. Of these guinea-pigs, 12 are regarded as controls. In each of these controls there occurs, within twenty-four hours, œdema of the thigh and of the abdominal wall. Within seventy-two hours at the most they die.

Into each of the other 12 guinea-pigs is injected intramuscularly into the left (the opposite) thigh 0·1 cubic centimetre (70 units) of concentrated *Clostridium welchii* antitoxin. This injection is made three hours after the inoculation of the culture. In these animals a swelling may occur at the site of inoculation of the culture, but this swelling invariably resolves. None of these animals die.

This experiment has been modified and confirmed. If the antitoxin is administered a short time before the living culture, only the very slightest, if any, swelling will occur at the infected spot. The fact is established that a lethal dose of living organisms may be rendered non-lethal by a small quantity of antitoxin administered even as late as three hours after the inoculation of those organisms.

It is, of course, difficult to establish an exact comparison between the washed organisms injected into the living muscle and the organisms which, growing in the uterus, endanger the life of a woman. Nevertheless, this experiment constitutes evidence from the laboratory that the antitoxin concerned is of prophylactic value. I understand that in certain cases of abortion and of labour the danger of infection by the *Clostridium welchii* may be foreseen. If so, there is evidence that something may be done to avert it.

The antitoxin is made from a strain of the organism obtained originally from the National Collection of Type Cultures, Lister Institute, London. We have now obtained 36 different strains of *Clostridium welchii* from the Women's Hospital and from other Australian sources. We have invariably found these local strains to correspond exactly with this overseas strain. The toxins made from the local strains are neutralized in exactly the expected proportions by the antitoxin made from the overseas strain. We have found no evidence whatever causing us to doubt the bacteriological integrity of the *Clostridium welchii*. It seems to be one strain, and one only, the world over.

I refer, of course, only to *Clostridium welchii* Type A. Three other types—B, C and D—have been described. All four types are of significance to veterinary surgeons, for they are responsible for widespread diseases in cattle and in sheep; but there is no recorded instance of Type B or C or D being pathogenic for human beings.

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(3) K. Heim: *"Zur Klinik der puerperalen Anaerobierinfektion", Zeitschrift für Geburtshülfe und Gynäkologie,* Volume CVI, 1933, page 198.
(4) A. M. Hill: "Post-Abortal and Puerperal Gas Gangrene", *The Journal of Obstetrics and Gynæcology of the British Empire,* Volume XLIII, April, 1936, page 201.

## PYELITIS IN CHILDREN.[1]

By EDGAR H. M. STEPHEN,
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My part tonight is to present a short paper on a physician's experience of pyelitis and an account of what have appeared to be satisfactory methods of treatment.

The urologist is the man who can best give an account of the various aberrations in structure or function that lead to a prolonged pyelitis and which, without his aid and care, may result in permanent impairment of renal function, in addition to the symptoms due to an infection of the kidney.

Like most people at the present time, I am of opinion that the term "pyelitis" is a misnomer, and that "pyelonephritis" is the only appropriate title for this disease. For the purpose of a reader of a paper it is convenient to use the word "pyelitis" as an abbreviation for the more lengthy "pyelonephritis". It appears to me quite improbable that the structure of the pelvis of the kidney could be responsible of itself for the quantity of pus common in this disease. I feel that the ancients have cast odium on the comparatively innocent pelvis instead of the real delinquent, the kidney. What reports there are to hand of the findings at autopsy give a picture of an interstitial suppurative nephritis, with pus passing into the tubules and thence into the urine.

In life, pyelitis makes its presence felt by symptoms varying in degree and by signs which are usually pleasingly definite.

The urinary tract is a masterpiece of physiological and chemical adroitness, and for the *Bacillus coli communis* to infect and derange it, a degree of stagnation must exist. It is natural that an organ so complex in development should be specially liable to abnormalities, and the pathological museum at a children's hospital provides many examples of kinked ureters, atrophic ureters, congenital hydronephrosis and renal cysts, which have led to the termination of life at an early age. Any evidence of congenital abnormality in other regions suggests the advisability of examination of

[1] Read at a meeting of the New South Wales Branch of the British Medical Association on October 28, 1937.

the urogenital tract. The mongol is a particular sufferer from defects in this tract.

I quite often see a membranous bridge uniting the *labia majora* of patients in early childhood. This bridge is sufficient of an obstacle to cause stagnation and the development of pyelitis. It is easy to sever this membrane with any instrument as blunt as the back of the handle of a scalpel. Frequency of micturition, irritation and bed-wetting may cease after this simple procedure, and pyelitis be averted or relieved. Another aid to stagnation is spasm of the ureter. That spasm of the ureter is a common event is demonstrated by the patient whose output of urine varies from day to day in its content of pus, sometimes containing none, in which case the patient has symptoms of toxicity and has a fever; or there is much pus and the patient is afebrile and comfortable.

It is said that bilateral infection is more frequent than unilateral infection. In children this does not seem to be true. When the symptom of tenderness in the loin is present, it is usually elicited on one side only. In reports I have received from the urologist infection on one side only has proved the more usual experience.

Leucorrhœa is sufficiently common to need exclusion in the provision of a specimen of urine for the pathologist; hence the necessity of a catheter specimen from female patients.

The characteristic report from the pathology department states that the urine is opalescent or turbid, is acid in reaction, and contains a trace of albumin, and that examination of the sediment shows motile bacilli. Examination with the high-power objective (one-sixth of an inch) of the microscope shows two to five cells or more per field. On culture the *Bacillus coli communis* is demonstrated. A report of contamination with *Staphylococcus albus* or *Bacillus enteritidis* creates no excitement.

The Royal Alexandra Hospital for Children has only 120 beds for the accommodation of medical cases, yet in twelve months 64 patients who had had pyelitis were discharged from the hospital. Of these, 54 were females and 10 were males. In 35 cases the illness was acute, in 29 it was chronic. Six of the children were twelve months old or younger; 21 were aged one to four years, and the balance (34) between four and thirteen years. Of these 64, eight were investigated and treated by the honorary urologists. Of the children in the first year of life, males are affected as often as females.

It can be truthfully stated that pyelitis is a common disease in childhood. One must remember that in addition to these 64 in-patients, a number, of which I have no record, were treated in the out-patient department.

Pyelitis is a frequent complication of pink disease and of diarrhœal diseases; such cases also are not included under "pyelitis". None of the 64 cases proved tuberculous; but I understand pyelitis has been a rather frequent occurrence in tuberculous disease of the spine at the Royal Alexandra Hospital for Children.

A point of special interest is that in males over one year of age who prove resistant to treatment, the radiologist reports *spina bifida occulta* in many instances.

The route of infection is hæmatogenous. In spite of the high incidence of the disease in females as compared with males, an ascending route has never been proved with any certainty.

The acute form of the disease bears the following characteristics. The onset is sudden, with great rise of temperature and vomiting. Tenderness in the loin may be elicited over the infected organ in all but the very young, in whom it cannot usually be determined. Painful and frequent micturition is complained of. There is a pronounced disinclination to partake of any nourishment or even fluids. Convulsions and meningismus are not uncommon. Several of the patients in this series had lumbar puncture performed on them. Pyrexia for eight days is frequent, and the temperature may fall in a manner reminiscent of the crisis in lobar pneumonia. The illness may be so severe as to cause considerable anxiety; but more often this grade is not reached, and a satisfactory response to treatment ends in complete recovery.

Diagnosis naturally is confirmed by pathological examination. The specimen of urine should be freshly agitated and with a one-sixth inch objective two to five leucocytes or more per field should be found by microscopic examination. Owing to the obstruction of the ureter on the affected side, whether by spasm or otherwise, the absence of this finding on one examination only should not be considered final; but examination should be repeated. In a few instances a profuse bacilluria without the presence of an increased number of cells is found with the usual symptoms of pyelitis.

Though infection by the *Bacillus proteus* is occasionally encountered when the urine is fœtid and alkaline in reaction, the *Bacillus coli communis* in urine strongly acid in reaction is the rule.

Treatment of acute pyelitis still depends on the rendering of the urine alkaline. The administration of potassium citrate, in doses of from 1·2 to 2·4 grammes (20 to 40 grains) every four hours, is a satisfactory procedure. It is usually necessary to continue its administration through the night. Various modifications of this method are administration every two hours till the urine is alkaline, or the combination of bicarbonate of soda with potassium citrate. It must be owned that both mixtures are disagreeable to take; but they can be made more nauseous by the addition of hyoscyamus. I consider hyoscyamus can be omitted without disadvantage. Copious fluids should be insisted on even if this necessitates introduction into the stomach by tube.

In differential diagnosis, appendicitis and pneumonia have to be excluded.

Interference with nitrogen excretion by the kidney is fortunately seldom encountered, and not at all in my present series.

After a fortnight's alkalinization, if the progress is not entirely satisfactory, one may prescribe hexamine and acid sodium phosphate. These are best given separately, the phosphate an hour after hexamine. In a few instances, after some weeks of treatment, the pyuria has been found to be derived from the bladder and the pyelitis to be a thing of the past. The indication of this change of scene is the persistence of pus and bacilli in urine that has been successfully maintained alkaline for a length of time, which in most instances has resulted in freedom from these elements. The patient, apart from these signs, seems improved, and the temperature is not elevated above normal. Usually there is no frequency.

On these grounds, somewhat delicate as they are, one may discontinue the administration of potassium citrate and substitute the instillation of two drachms of a 10% solution of "Argyrol" into the bladder every day, with or without previous irrigation. The other, more precise, course would be to refer the patient to the urologist. Where this is not practicable the first alternative can be utilized with a sanguine outlook.

The cases of chronic pyelitis that I shall describe are those that may reasonably be considered in the province of the physician. The usual history given is that for many weeks or months the child has been in indifferent health. She is usually pale and easily fatigued, and she has had an interrupted career at school. At frequent intervals she experiences a day or so of mild pyrexia, with accompanying malaise; there are frequency of micturition, irritation and possibly enuresis. She has anorexia and wants to lie about. There may be a history of acute pyelitis at some previous date, and the present trouble may be the result of treatment not sufficiently energetic or not continued long enough to ensure complete recovery. Examination may disclose the existence of infected tonsils or some other debilitating condition predisposing to the recurrence of pyelitis. Before the care of the patient is relinquished, the removal of such tonsils should be ensured.

In differential diagnosis recurrent attacks of appendicitis or tonsillitis and cyclic vomiting must be excluded. In some instances a diseased appendix is found to be the explanation of recurring pyelitis.

It is in chronic pyelitis that mandelic acid therapy has won well-deserved praise. This substance, when given by mouth, is excreted unaltered in the urine, where it exerts a bacteriostatic effect. During treatment the pH of the urine must be kept between 5·0 and 5·5. This should be tested daily, methyl red being used as an indicator. For children over three years, six grammes are given daily; for younger children, four grammes. The preparation I have used recently is "Mandelix". The administration of half a drachm of this three times a day to a child of three years proved rapidly successful.

The use of a ketogenic diet has been recommended in the past. It proved so difficult to induce the girls to take a diet so high in fat content that we were obliged to abandon its use at the Royal Alexandra Hospital for Children.

The association of pyelonephritis with rat-bite fever is worthy of mention. In fatal cases gross lesions of the kidney are seen at autopsy. I have had experience of one instance of this, and its occurrence is deeply impressed on my memory.

It is my custom to refer to a urologist all cases in which there is a history of long-continued ill-health suggesting the existence of some anatomical or developmental abnormality and, in addition to these, cases which prove resistant to treatment after a period of several weeks. I am one more witness of the success of the urologist's labours in such cases.

After tasting the usual mixtures containing potassium citrate, I prevailed on the dispenser at the Royal Alexandra Hospital for Children to provide me with some alternative. I can assure you that the following prescriptions are quite palatable, if not actually enticing.

℞

(1) Potassium citrate, 2·4 grammes (40 grains).
Simple syrup, 0·6 mil (10 minims).
Chloroform water to 8·0 mils (2 fluid drachms).

℞

(2) Potassium citrate, 2·4 grammes (40 grains).
Simple syrup, 0·6 mil (10 minims).
Compound decoction of sarsaparilla to 8·0 mils (2 fluid drachms).

The first is, in my opinion, the more appropriate for the younger patients, the latter for the more advanced. These mixtures are the contribution of our dispenser and myself towards making the world a brighter and happier place, and make a suitable termination to my contribution this evening.

## POSTERIOR NASAL SINUSITIS.[1]

By CLIVE M. EADIE,
*Melbourne.*

POSTERIOR nasal sinusitis, which includes inflammation of the sphenoidal sinuses and the posterior ethmoidal cells, is of special interest on account of the intimately related important structures. The diagnosis and treatment of these infections do not appear to be recognized today to the same extent as those of anterior sinusitis; therefore I felt that a few remarks on this subject might be of some interest.

### Development of the Sphenoidal Sinus.

According to Schaeffer, the sphenoidal sinus arises primarily in relation with the posterior cupola of the cartilaginous nasal capsule, and is genetically demonstrable as early as the fourth month of fœtal

[1] Read at the fifth session of the Australasian Medical Congress (British Medical Association), August, 1937.

life. This is the terminal nasal sinus or primitive sphenoidal sinus. No portion of the fœtal sphenoidal sinus is contained within the sphenoidal bone. It is not until the fourth year of extrauterine life that the body of the sphenoidal bone bounds the sinus. By the second or third year, the sphenoidal sinus has assumed proportions sufficiently large for it to retain infectious material in its cavities (Schaeffer).

Growth occurs more in a dorso-lateral direction, so that at an early stage the ophthalmic and maxillary divisions of the fifth nerve may be in intimate relation.

### Development of the Posterior Ethmoid Cells.

The lateral masses of the ethmoid bone are primarily solid structures. The posterior ethmoid cells originate as evaginations of the nasal mucosa lining the superior and first supreme nasal meatuses, or from accessory furrows and recesses that configure the lateral walls of these meatuses. The initial out-punchings are present by the fourth month of fœtal life; by the seventh month they have become tubular, and at birth the posterior ethmoid cells measure five by four by two millimetres.

The cells vary in individual size and in number. According to Schaeffer there may be from three to fifteen. The direction and distance in which each cell grows from its originating ostium in the meatus also vary very greatly. Thus we find ethmo-maxillary, ethmo-sphenoidal and ethmo-frontal cells, and in certain cases a posterior ethmoid cell may be present in the position usually occupied by an anterior cell. This naturally has a considerable bearing on the symptoms and signs caused by infection of these cells.

### Anatomical Findings.

In order to demonstrate the adult anatomy I will show some slides.[1]

Anatomical observations were made *post mortem*. In Table I the relative sizes of the sphenoidal sinuses are set out.

Table I.

*Size of Sphenoidal Sinuses in 137 Cases.*[1]

| Size. | Right.[2] | Left.[3] |
|---|---|---|
| Moderate or normal | 68 | 63 |
| Large | 39 | 36 |
| Small | 30 | 38 |
| Total | 137 | 137 |

[1] In Case 34 the left sphenoidal sinus was absent.
[2] Right larger than left in 33 cases.
[3] Left larger than right in 29 cases.

Deviations of the sphenoidal septum were noted in Case CCXXII, and in Case CXXV the right sinus alone was related to the *sella turcica*. In Case CXXIV the left the left sinus alone was related to the *sella turcica*. (The septum was grossly deviated to the left in two cases.)

Secondary sphenoidal septa were noted. In Cases LI and LXXXVI an antero-posterior septum was found in the right sinus. In Case CXX a transverse septum was found in the right sinus. In case CXXVII a transverse septum was found in the left sinus. Many septa running in various directions and forming pockets were found in the left sinus in Case CIII and in the right and left sinuses in Case XCII.

[1] At this stage Dr. Eadie showed a number of slides demonstrating anatomical features.

Table II.

*Sphenoidal Recesses in 137 Cases.*

| Position of Recess. | Right. | Left. |
|---|---|---|
| Pterygoid (caudal) | 23 | 24 |
| Dorsal | 14 | 10 |
| Lateral | 7 | 8 |
| Caudal | 3 | 2 |
| Total | 47 | 44 |

The following sphenoidal abnormalities were noted. In Case LXXXIII a foramen was found entering the floor of the left sphenoidal sinus. In Case XXII there was a dehiscence in the floor of the left sinus into the *sella turcica*. In Case CXXI two rounded yellow bony bosses about the size of wheat seeds were found on the floor of each sphenoidal sinus. In five instances the ostia were abnormally small, being almost pin-point in size, and in one instance the right ostium was fenestrated.

Sphenoidal sinus diverticula may be either (*a*) recess-like extensions into surrounding parts or (*b*) mucosal diverticula through dehiscences in the osseous wall. The *dura mater* may be pushed ahead of such a mucosal evagination, or there may be an aperture in the dura through which the sphenoidal mucosa projects, coming into contact with the arachnoid. These recesses may extend ventrally, cranially, laterally, caudally or dorsally. In a total of 137 cases there were 47 recesses from the right sphenoidal sinus and 44 from the left. (See Table II.) The pterygoid recess, which is really a caudal recess, was most frequently found. The anatomical relations of these recesses are most important when the results of their infection are being considered.

### Physiology of the Sphenoidal Sinuses.

The function of the sinuses does not appear to be at all clear. In some forms of life olfactory folds are found in the sphenoidal sinuses; probably with the reduction of the sense of smell in man there is loss of this primitive olfactory function. Theories that have been advanced of the function of the sphenoidal sinuses are (*a*) that they act as an adjunct to respiration by humidifying and warming the inspired air, that they supply pneumatization necessary for the equipoise of the head and that they are useful in vocalization. That there is some bactericidal property in the secretion of the sinus mucosa is suggested by the fact that the sphenoidal sinuses are normally sterile (Bertarilli, Calaenida and Watson Williams). In a series of sphenoidal sinuses that I investigated by suction exploration and attempted culture, 38% were sterile. Experimentally and clinically, they certainly seem to exert

a marked inhibitory action on the growth of organisms.

### Pathology of the Sphenoidal Sinuses.

Table III indicates the proportion of cases in which signs of inflammation were found on *post mortem* examination in 148 cases. In 52 cases signs of inflammation were found in one or both sphenoidal sinuses—that is, in 35%. This percentage indicates the relatively high frequency with which sphenoidal sinusitis occurs. In Case XXXIV only one sphenoidal sinus was present, so that altogether 295 sinuses were examined. Two hundred and nine sinuses appeared free of inflammation, and 86, or 29%, showed definite signs of inflammation. The right sinus was affected in 48 cases and the left sinus in 38 cases. As the table shows, the right sinus was alone affected in 14 cases, the left sinus alone in 4 cases, and in 34 cases both right and left sinuses were involved. It is notable that in this series of cases of sphenoidal sinusitis both sides were usually inflamed together, but that when only one cavity was affected it was more frequently the right. It has previously been noted that the right sinus is frequently the larger cavity of the two and also that it more often has recesses.

TABLE III.

*The State of the Mucosa found Post Mortem in the Sphenoidal Sinus in 148 Cases.*[1]

| | Right. | Left. | Right Sinus Alone Infected. | Left Sinus Alone Infected. | Both Sinuses Infected. |
|---|---|---|---|---|---|
| Normal Non-inflammatory .. .. | 100 | 109 | — | — | — |
| Signs of Inflammation | 48 | 38 | 14 | 4 | 34 |
| Total .. .. | 148 | 147 | | | |

[1] In Case 34 the left sphenoidal sinus was absent.

Drainage after an acute inflammatory lesion is likely to be inadequate and a chronic condition is likely to supervene and to progress.

Polypi were present in three cases.

CASE CVI.—A polypus the size of a pea was present in the anterior wall of the right sphenoidal sinus. The rest of the membrane was thin.

CASE CXV.—A polypus was present in each sphenoidal sinus, situated on the anterior wall near the ostium.

CASE CXXXVII.—Attached to the anterior superior wall of the right sinus near the ostium was a shrivelled-up tag, apparently a polypus undergoing absorption.

This small series bears out the generally recognized fact that polypi in the sphenoidal sinus usually originate from the mucosa near the ostium.

CASE CXXXI.—There was a low sessile œdematous swelling on the postero-lateral wall of the right sphenoidal sinus. The rest of the membrane was thin, not showing any hyperplasia. This evidently was a localized inflammatory condition such as is often found in the maxillary antral mucosa.

In these cases macroscopic signs of inflammation only were recorded.

The normal membrane, as you know, is very thin, almost transparent and readily peels off from the bony walls.

I regarded any thickening, either local or general, of the mucosa, with or without the presence of pus or mucopus or of brownish fluid in the sinus, as indicative of an inflammation.

### Suction Exploration of the Sphenoidal Sinuses.

A further investigation was made of a series of 89 living patients by the suction exploration method of P. Watson Williams. Culture and macroscopic examinations of the contents were very kindly carried out by Dr. Bryce at the Walter and Eliza Hall Institute of Research in Pathology and Medicine, Royal Melbourne Hospital. Out of this series of 89 cases, in 36 cases no results were obtained on attempted culture and macroscopic appearances were normal; in 53 cases the results were positive.

In two cases pus was sucked out of the sphenoid sinus, but on attempted culture and microscopic examination no organisms were found. These two are included with the positive results.

Thus in a total of 55 cases, or 61%, signs of infection were demonstrated. These patients all showed clinical signs of naso-pharyngeal infection, and this would explain why the percentage is higher than that found in the *post mortem* series.

The *post mortem* cases were general cases coming to routine autopsy.

The different organisms found in 53 cases after suction exploration of the nasal sinuses were the following: *Staphylococcus aureus* was found 15 times; hæmolytic *Staphylococcus aureus*, seven times; *Staphylococcus albus*, 16 times; a colourless streptococcus, 12 times; *Streptococcus viridans*, 19 times; a hæmolytic streptococcus, twice; pneumococci, twice; *Bacillus coli*, twice; *Bacillus subtilis*, three times; coliform organisms, three times; Gram-negative bacilli of the Friedländer type, once; Gram-negative bacilli of unknown pathogen, 10 times; yeast-like organisms of the Morrilia type, once; and pus with no growth of organisms, once.

The results of suction exploration of one or more sphenoidal sinuses or maxillary antra in 45 cases are shown in Table IV.

TABLE IV.

*45 Cases in which a Positive Result was obtained by Suction Exploration from One or More Sphenoidal Sinus or Maxillary Antrum.*

| | Times. |
|---|---|
| Right sphenoid infected .. .. .. .. .. | 32 |
| Left sphenoid infected .. .. .. .. .. .. | 34 |
| Right and left sphenoids infected .. .. .. .. | 20 |
| Right sphenoid alone infected (left sphenoid, right and left antra negative) .. .. .. .. .. | 9 |
| Left sphenoid alone infected (right sphenoid, right and left antra negative) .. .. .. .. .. | 10 |
| Right and left sphenoids and right and left antra all infected .. .. .. .. .. .. .. | 13 |
| Right sphenoid and right antrum alone infected .. .. | 4 |
| Left sphenoid and left antrum alone infected .. .. | 3 |
| Right sphenoid and left antrum alone infected .. .. | 2 |
| Left sphenoid and right antrum alone infected .. .. | 1 |

In ten cases, after performing a suction exploration according to the P. Watson Williams technique, I went on to do the radical maxillary antrum operation, removing the infected lining mucosa. This membrane, under aseptic conditions, was sent to the laboratory for examination and culture of organisms. By this means I wished to find out whether the fluid washed out of the sinus was a true indication of that sinus's infected state. The results will be seen in Table V.

TABLE V

*10 Cases Contrasting the Result of Examination for Organisms of Washout Fluid from an Antrum with that of the Mucosa.*

| Case. | Washout. | | Mucosa. |
|---|---|---|---|
| I R.S. 23 years. 7/8/33 | Right. | No growth. | *Streptococcus viridans.* |
| | Left. | No growth. | *Streptococcus viridans.* |
| II J.D. 43 years. 24/8/32. | Right. | Gram-negative bacilli. | *Staphylococcus albus.* *Streptococcus viridans.* |
| | Left. | Streptococci. | *Staphylococcus albus.* *Streptococcus viridans.* |
| III G.G. 34 years. 13/10/32. | Right. | No growth. | *Streptococcus viridans.* |
| | Left. | No growth. | No growth. |
| IV J.C. 46 years. 30/11/31. | Right. | No growth. | *Staphylococcus albus.* |
| | Left | No growth. | *Staphylococcus albus.* *Streptococcus viridans.* |
| V W.L. 30/9/32. | Right. | No growth. | No growth. |
| | Left. | No growth. | *Staphylococcus albus.* |
| VI A.F. 9/5/32. | Right. | No growth. | No growth. |
| | Left. | No growth. | No growth. |
| VII A.G. 64 years. 17/8/32. | Right. | No growth. | *Staphylococcus aureus.* Colourless streptococci. |
| | Left | No growth. | *Staphylococcus aureus.* Colourless streptococci. |
| VIII C.H. 50 years. 12/10/32. | Right. | *Streptococcus viridans.* *Staphylococcus albus.* | — |
| | Left. | No growth. | No growth. |
| IX T.H. 24 years. 9/8/32. | Right. | — | — |
| | Left. | No growth. | No growth. |
| X L.W. 24 years. 2/8/32. | Right. | No growth. | — |
| | Left. | No growth. | *Staphylococcus albus* (hæmolytic). |

In six of the ten cases, therefore, the "washout" revealed no abnormality, whilst the mucosa was infected and grew organisms. In three cases neither the "washout" nor examination of the mucosa revealed any abnormality. In one case both the "washout" and examination of the mucosa gave positive results.

It would appear that a negative result from attempted culture and examination of the "washout" of a sinus does not mean necessarily that that sinus is not infected. It is possible to say only that suction exploration of nasal sinuses as a method of diagnosis is of value only if a positive result is obtained. A negative result is to be ignored. As a method of treatment, however, in certain cases this procedure is of real value.

In order to discuss symptoms, signs, and treatment of posterior nasal sinusitis, I thought that it would be of more interest if I recorded a few actual cases. You are all quite conversant with the ordinary routine examination.[1]

In regard to the value of X rays in diagnosis, I find that a report from a radiologist who has specialized in nasal sinus work is of very great value, more particularly if it is positive; but I do not think that a negative result excludes the possibility of some infection localized, perhaps, in a diverticulum of the sinus.

## MATERNAL NUTRITION AND NEONATAL DEATHS: A COMPARISON OF THE NEONATAL MORTALITY RATES OF QUEENSLAND AND SOUTH AUSTRALIA.

By A. JEFFERIS TURNER, M.D. (London), D.P.H. (Cambridge),
*Director of Infant Welfare in Queensland.*

FOR many years New Zealand has held the world's record for the lowness of its infant mortality rate, that is, the number of annual deaths in the first year of life per thousand births. During the same period the infant mortality rates of our Australian States have been greatly lowered. This is a matter of common knowledge and is sufficiently summarized in Tables I and II.

TABLE I.

*Average Infant Mortality Rate per 1,000 Births in Five-year Periods in the Australian States and New Zealand.*

| Years. | Queensland. | New South Wales. | Victoria. | South Australia. | Western Australia. | Tasmania. | New Zealand. |
|---|---|---|---|---|---|---|---|
| 1912–1916 .. .. | 66·6 | 71·0 | 73·3 | 69·7 | 70·7 | 71·2 | 52·5 |
| 1917–1921 .. .. | 60·2 | 64·3 | 66·6 | 60·3 | 64·0 | 64·3 | 48·1 |
| 1922–1926 .. .. | 50·3 | 57·4 | 58·0 | 50·0 | 53·6 | 54·0 | 41·1 |
| 1927–1931 .. .. | 44·6 | 52·0 | 50·0 | 45·3 | 47·7 | 53·4 | 35·1 |
| 1932–1936 .. .. | 39·4 | 41·9 | 42·3 | 34·1 | 40·9 | 45·2 | 31·6 |

It will be noted that the New Zealand mortality rate is still falling, but only slightly in the last three years. Very noteworthy is the fall in that of South Australia, which last year reached to within one decimal point of the New Zealand rate. Next

[1] At this stage Dr. Eadie threw on the screen slides showing *résumés* of case histories. These are not published owing to lack of space.

TABLE II.

*Annual Infant Mortality Rate per 1,000 Births in the Australian States and New Zealand in the Ten Years to 1936.*

| Year. | Queensland. | New South Wales. | Victoria. | South Australia. | Western Australia. | Tasmania. | New Zealand. |
|---|---|---|---|---|---|---|---|
| 1927 .. .. .. | 54·5 | 55·0 | 56·1 | 53·4 | 45·9 | 53·0 | 38·7 |
| 1928 .. .. .. | 45·5 | 54·9 | 55·6 | 47·5 | 48·1 | 64·0 | 35·9 |
| 1929 .. .. .. | 46·1 | 56·6 | 47·2 | 40·9 | 56·2 | 53·2 | 34·1 |
| 1930 .. .. .. | 40·2 | 49·8 | 46·6 | 48·4 | 46·7 | 50·6 | 34·5 |
| 1931 .. .. .. | 36·6 | 43·5 | 44·5 | 36·4 | 41·5 | 46·0 | 32·2 |
| 1932 .. .. .. | 40·3 | 41·6 | 43·0 | 36·7 | 44·6 | 40·3 | 33·7 |
| 1933 .. .. .. | 42·6 | 39·3 | 40·4 | 32·1 | 36·8 | 41·1 | 31·6 |
| 1934 .. .. .. | 40·6 | 46·4 | 44·6 | 35·6 | 40·9 | 42·3 | 31·7 |
| 1935 .. .. .. | 37·3 | 39·4 | 41·2 | 35·0 | 40·2 | 51·8 | 32·2 |
| 1936 .. .. .. | 36·2 | 43·5 | 42·3 | 31·1 | 42·2 | 49·6 | 31·0 |

in order comes that of Queensland, with those of Western Australia, Victoria and New South Wales not far behind.

deaths during the first month, 86% occurred during the first week, and these were all due to what have been classified as antenatal causes, and may appropriately be called neonatal deaths. Also that the number of deaths during the first month correspond very closely to those from antenatal causes. In comparing the neonatal deaths of Queensland with those of another State, we may fairly make use of the first month mortality rate instead of analysing the causes of death given in the death certificates, which would be difficult to accomplish.

The infant mortality rates in Queensland and South Australia used to be equal; but since 1931 the rate in the latter State has been lower, and was especially lower in the year 1936. This is illustrated in Figure I. Endeavouring to find some explanation for this result, it occurred to me to compare the mortality rates for the first month and for the next eleven months of the two States. The

TABLE III

*Infant Mortality—Queensland, 1931–1936.*

| Year. | Number of Births. | Deaths under One Year. | Antenatal Causes. | Bronchitis and Pneumonia. | Diarrhœal Diseases. | Whooping Cough. | Diphtheria. | Influenza. | Measles. | Total from These Infections. | All other Causes. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1931 .. .. .. | 17,833 | 652 | 462 | 63 | 34 | 9 | 2 | 6 | .. | 17 | 76 |
| 1932 .. .. .. | 17,367 | 699 | 508 | 64 | 34 | 14 | 4 | 10 | .. | 28 | 62 |
| 1933 .. .. .. | 17,150 | 731 | 500 | 86 | 39 | 13 | 3 | 13 | 4 | 33 | 73 |
| 1934 .. .. .. | 17,360 | 705 | 511 | 58 | 25 | 32 | 4 | 5 | 1 | 42 | 68 |
| 1935 .. .. .. | 17,688 | 659 | 481 | 59 | 26 | 13 | 2 | 6 | 1 | 22 | 71 |
| 1936 .. .. .. | 18,755 | 679 | 490 | 75 | 29 | 9 | 5 | 5 | 1 | 20 | 65 |

By examining and classifying the causes of death given in the death certificates of infants under one year of age in Queensland for the last six years I have obtained the information shown in Table III. We are at once struck by the great preponderance of deaths due to antenatal causes. Under this heading are premature births, congenital weakness, malformations, birth injuries, some diseases peculiar to the neonatal period *et cetera*. Still-births are not included. The mortality from diarrhœal diseases, formerly the scourge of infancy, has now been reduced to comparatively small proportions. That from bronchitis and pneumonia and that from several respiratory infections, both of which are not easily controlled, form a variable feature. Under "Other Causes" are ranged a number of deaths which do not lend themselves to classification.

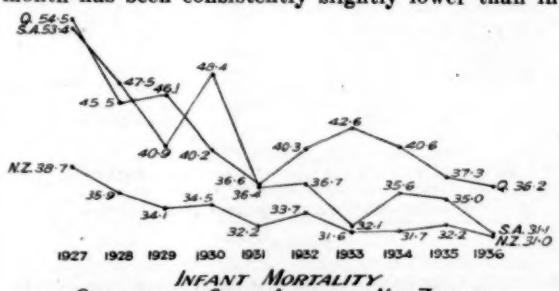
Another method of classifying these deaths is by age (see Table IV). It will be noticed that of the

TABLE IV.

*Infant Mortality in Queensland in the Years 1934–1936.*

| Year. | First Week. | | First Month. | | In following Eleven Months. | |
|---|---|---|---|---|---|---|
| | Number of Deaths. | Mortality Rate per Thousand. | Number of Deaths. | Mortality Rate per Thousand. | Number of Deaths. | Mortality Rate per Thousand. |
| 1934 | 432 | 24·9 | 503 | 29·0 | 202 | 11·6 |
| 1935 | 417 | 23·6 | 482 | 27·3 | 177 | 10·0 |
| 1936 | 427 | 22·8 | 494 | 26·3 | 185 | 9·9 |

result is shown in Table V. It appears that in the three years 1934-1936 the mortality rate in Queensland during the eleven months following the first month has been consistently slightly lower than in




*INFANT MORTALITY*
*QUEENSLAND, SOUTH AUSTRALIA, NEW ZEALAND*

FIGURE I.

South Australia, but that this advantage has been more than counterbalanced by the lower rate during the first month in South Australia.

TABLE V.

*Infant Mortality Rate per 1,000 Births in Queensland and South Australia.*

| Year. | In First Month. | | In next Eleven Months. | | In First Year. | |
|---|---|---|---|---|---|---|
| | Queensland. | South Australia. | Queensland. | South Australia. | Queensland. | South Australia. |
| 1934 | 29·0 | 22·3 | 11·6 | 13·2 | 40·6 | 35·6 |
| 1935 | 27·3 | 23·8 | 10·0 | 11·1 | 37·3 | 35·0 |
| 1936 | 26·3 | 20·8 | 9·9 | 10·3 | 36·2 | 31·1 |

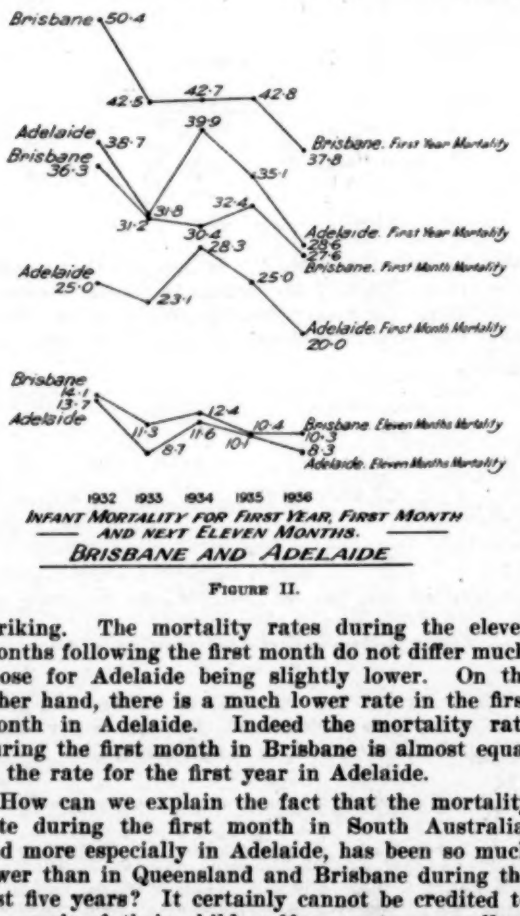
This result stimulated me to make a comparison of these mortality rates in the city of Brisbane and the Adelaide metropolitan area. The two are

Table VI.

*Infant Mortality Rates per 1,000 Births in Brisbane and Adelaide.*

| Year. | In First Month. | | In Next Eleven Months. | | In First Year. | |
|---|---|---|---|---|---|---|
| | Brisbane. | Adelaide. | Brisbane. | Adelaide. | Brisbane. | Adelaide. |
| 1932 | 36·3 | 25·0 | 14·1 | 13·7 | 50·4 | 38·7 |
| 1933 | 31·2 | 23·1 | 11·3 | 8·7 | 42·5 | 31·8 |
| 1934 | 30·4 | 28·3 | 12·4 | 11·6 | 42·7 | 39·9 |
| 1935 | 32·4 | 25·0 | 10·4 | 10·1 | 42·8 | 35·1 |
| 1936 | 27·6 | 20·0 | 10·3 | 8·3 | 37·8 | 28·6 |

fair subjects for comparison, the populations being approximately equal (Brisbane had 313,430 and Adelaide 316,858 at the end of 1936). In 1936 the number of births in Brisbane was 4,862; in Adelaide, 4,296. These figures are more clearly displayed in Figure II. These results are very




*Infant Mortality for First Year, First Month and next Eleven Months.*

*Brisbane and Adelaide*

Figure II.

striking. The mortality rates during the eleven months following the first month do not differ much, those for Adelaide being slightly lower. On the other hand, there is a much lower rate in the first month in Adelaide. Indeed the mortality rate during the first month in Brisbane is almost equal to the rate for the first year in Adelaide.

How can we explain the fact that the mortality rate during the first month in South Australia, and more especially in Adelaide, has been so much lower than in Queensland and Brisbane during the last five years? It certainly cannot be credited to the work of their child welfare centres, excellent as that is; for infants are only extremely rarely brought to these centres during their first week, in which about 85% of this mortality occurs. Indeed very few are brought to them before the age of two weeks, and not many before three weeks. Neonatal or first-month mortality can be reduced only (i) by improved health of the mothers and (ii) to a less extent by better management at the birth. There is no reason to think that the latter is greatly superior in South Australia. Antenatal clinics exist in both States, and there is no reason to think that there is any great disparity between them in efficiency. Better nutrition is a possible cause; for it scarcely needs proving that well-nourished mothers will, on the whole, produce stronger babies with a larger percentage of survivals than mothers suffering more or less from malnutrition. A careful examination of the facts gives strong support to the opinion that this is the real cause. The last seven years have been years of economic depression and unemployment, only partially relieved towards their end. The unemployed are mostly concentrated in the capitals, even more so in Adelaide, whose population amounts to more than one-half of that of the whole State, than in Brisbane, where it amounts to about one-third. It is the people of this unemployed class (in Queensland they are known as "relief workers") who are most exposed to the danger of malnutrition.

All over Queensland, both urban and rural, the most important cause of malnutrition among women is the great deficiency of milk in their diet, and this is especially harmful during pregnancy. Much of this is due to want of knowledge and not to economic causes; but it is greatly aggravated among those living on the edge of subsistence. During the "depression" the South Australian Government adopted the wise policy of supplying milk rations to the families of the unemployed. This distribution of milk to children and mothers commenced in 1930, and in 1934 I was informed that the health authorities in Adelaide were much impressed by the improved nutrition of the children, which was better than it had been in the years of general employment. The children of the unemployed were, I was told, mostly stronger and healthier than they had ever been. In 1935 the South Australian Government requested the British Medical Association to advise it on this matter, and a committee of the Association strongly recommended that every child up to six years of age receiving rations should be given one pint of milk daily, children aged six to thirteen years half a pint, expectant and nursing mothers one and a half pints, in addition to other rations. This advice was adopted by the Government. Dr. Angas Johnson, Medical Officer of Health for the City of Adelaide, informs me that the milk ration is issued to every mother who produces a medical certificate that she is pregnant and needs the milk, and that the question of need is considered in a liberal spirit. This, I am convinced, is the true explanation, simple, rational and adequate. From it I draw three conclusions:

1. The present high neonatal or first-month mortality of the Australian States can be considerably reduced.

2. This reduction has been accomplished in South Australia.

3. This is a matter that demands the careful and earnest attention of all who are interested in saving infant life.

**Acknowledgements.**

I must thank Mr. S. E. Solomon, Chief Statistical Officer, Queensland, and Mr. A. W. Bowden, A.L.A., Government Statist, South Australia, for the figures contained in this paper, and Dr. Angas Johnson, Medical Officer of Health, City of Adelaide, for other information.

# Reports of Cases.

## PERITONITIS IN AN INSANE PATIENT, DUE TO PERFORATION FROM A FOREIGN BODY, WITHOUT SYMPTOMS TILL HALF AN HOUR BEFORE DEATH.

By P. BROWNE, M.B.,
*Resident Medical Officer, Parkside Mental Hospital,*

AND

J. B. CLELAND, M.D.,
*Pathologist, Parkside Mental Hospital, South Australia.*

THE following case is of interest as showing that not infrequently in the insane symptoms due to grave conditions may be manifested only just before the patient dies, though the condition itself must have been present for a considerably longer period. The same phenomenon occurs in animals.

The patient was a woman of forty-one who had been nearly seven years in the Parkside Mental Hospital suffering from *dementia præcox*. She showed a persistent propensity to eating rags and other foreign bodies. Though every effort was made to restrain her in this respect, she had on many occasions been able to swallow harmful objects. On August 15 she had her dinner, apparently as usual, at 1 o'clock. At 2.45 p.m. the nurse noticed that the patient was cyanosed and had collapsed in the airing court. She was examined by one of us at 2.55 p.m., who found her with an imperceptible pulse, respirations 50, a distended abdomen, but no pyrexia. A piece of cloth was removed from her throat. One cubic centimetre of "Coramin" was given, but she died at 3.15 p.m., half an hour after she had first been noticed as being ill.

The autopsy (number 435) showed in the descending colon a semi-impacted mass of fæcal material with five narrow strips of cloth, flannel *et cetera*, each about six to eight inches long, a twisted coil of fibre, some small stones and a narrow piece of wood, three inches long, spear-shaped, the point of which had lacerated and pierced the mucosa and was projecting through the serous coat. In the small intestines there were a piece of paper and a rib bone. There was congestion and a purulent exudate on the under aspect of the omentum and on the small intestines, and a handful of turbid pus in each loin. The intestines were slightly glued together. On inspection of the mucosa opposite the perforation, several longitudinal excoriations, of a jagged appearance and one inch or more long, running in several directions, were noticed. It is remarkable that this patient should have had a considerable degree of peritonitis and yet had eaten her dinner as usual at 1 o'clock. She was found collapsed one and three-quarter hours later, and died two and a half hours after eating her meal; her meal doubtless had become a matter of pure routine to her.

**Acknowledgement.**

We are indebted to the medical superintendent, Dr. Birch, for permission to publish the case.

## AN UNUSUAL CASE OF HÆMOPTYSIS.

By A. M. WATKINS, M.B., B.S.,
*Roseville, New South Wales.*

I WAS summoned to attend Mrs. A.L., aged seventy years, as she was spitting blood. She had fallen over a stool and had bruised the inside of the right knee and then struck her forehead on an ottoman. Some eight hours after this she began spitting blood.

On examination there was a circular area of crepitation about a crown in diameter in the mid-clavicular line in the right upper lobe of the lung; this appeared to be the source of the severe hæmoptysis. The right upper lid showed ptosis, the pupil was contracted, and this side of the face was flushed.

Small doses (0·24 gramme or four grains) of Dover's powder, together with 0·06 gramme (one grain) of *Hydrargyrum cum Creta* were given in a capsule every four hours, a treatment which I have found of great value in pulmonary bleeding. The hæmorrhage ceased in two days, but recurred in lesser amounts at similar periods for the ensuing five weeks, and then all crepitation and signs in the lung disappeared. Throughout the illness there was no elevation in temperature and the patient was quite comfortable.

I assumed that damage to the spinal cord, at the lower cervical region, was occasioned by the fall, causing irritation of the sympathetic system and arterial erosion in the lung due to vagus nerve irritation.

Professor Jellinek, of Vienna, has drawn attention to the ptosis, enophthalmos and contraction of the pupil (so-called Horner's syndrome), together with ulnar paralysis and hæmoptysis, in a patient of his who came in contact with a 4,000-volt electrical current. In Professor Jellinek's case there was an enophthalmos which was not present in mine, and the trauma was occasioned in a different manner.

# Reviews.

## A MEDICAL PIONEER OF VICTORIA.

IT is right and proper that the names of early colonists worthy of our remembrance should be resurrected from forgotten files to serve as an inspiration and a hopeful encouragement to those whose duty it will be to carry on the work of building a nation. R. H. Croll, in collaboration with Dr. R. R. Wettenhall, has in a small volume, "Dr. Alexander Thomson, Pioneer",[1] paid a graceful tribute to the indomitable spirit and sterling character of a medical man who was intimately associated with early settlement in Victoria.

This short biographical sketch maintains a lively interest throughout its pages. It commences with a reference to Dr. Thomson's early life in the Old Country, his migration to Van Diemen's Land in 1831, his first colonial enterprises as the holder of a pastoral property at Break-o'-Day Plains on the east coast and as the promoter of a ferry service between Hobart Town and Kangaroo Point. For

[1] "Dr. Alexander Thomson: A Pioneer of Melbourne and Founder of Geelong", by R. H. Croll, in collaboration with R. R. Wettenhall; 1937. Melbourne: Robertson and Mullens. Crown 4to, pp. 61, with illustrations. Price: 7s. 6d. net.

this purpose he purchased the *Surprise*, now historically notable as the first steam packet to be built in Australia.

In 1836 the hardy and industrious Aberdonian transferred all that was his from Tasmania to John Batman's somewhat disturbed settlement on the Yarra. Here he ministered to the physical, and on Sabbath days to the spiritual, needs of the small community, then consisting of the original members of the Port Phillip Association and their families. He also took a prominent part in helping to effect a conciliation with the Governor of New South Wales for what was in essence a delightfully innocent acquisition of Crown lands, even if officialdom held the view that it was in a strict sense completely unauthorized.

In subsequent chapters the authors trace the history of Geelong back to 1837, when Dr. Thomson was granted land adjacent to the western shores of Port Phillip, where he was successful in maintaining his first large grazing property and in fostering the development of a prosperous town and district. The records show that this man of dynamic and forceful personality was as much concerned with the public weal as with his own private interests, and that he did all within his power, not only as mayor of Geelong for many years, but as parliamentary representative in the first legislature of the new colony, to set up local institutions upon a firm basis of security and to bring happiness and contentment to the people.

The book is well written and should appeal to those who admire empire builders or have some interest in the history of Australian colonization.

## DIABETES MELLITUS AND ITS TREATMENT.

THE recent introduction of insulin compounds, the action of which is considerably prolonged, is likely to be fraught with changes in the management of the diabetic patient. In this, the sixth edition of his book, Joslin records his experiences with over 1,000 patients treated with protamine insulin and protamine zinc insulin.[1] To Joslin this recent development in diabetic treatment heralds a new era in our knowledge of the disease. With an experience of under two years he is naturally guarded in his statements, despite the number of patients he has treated. A new chapter has been added on protamine insulin, and here is found a concise and authoritative summary of our knowledge of this substance. While enthusiastic, Joslin is guarded in his statements, and cautions the physician against the unnecessary changing of a well-stabilized patient to the new insulin. He points out the difficulties which may be experienced in using protamine insulin, but has not devoted much attention to the variations in the distribution of the diet throughout the day which are necessitated by the use of an insulin which is often administered only once in twenty-four hours. This is in great contrast to the detailed instructions regarding the method of changing from regular insulin to protamine insulin.

A new chapter on hypoglycæmia and hypoglycæmic reactions briefly summarizes our present knowledge on this subject.

Readers familiar with British opinion will perhaps take exception to the criteria considered necessary for the diagnosis of renal glycosuria, the majority of persons suffering from what is known in British literature as "renal glycosuria" being classified by Joslin as "potential diabetics". This classification is even more surprising in view of a statement which is made on page 641: "It is surprising how few of our cases classified as potential diabetics later become true diabetics. It would appear as if a diagnosis of potential diabetes predisposed that individual to health and that he was a good risk for an insurance company."

The book contains a vast amount of important statistical material which is of great importance to all interested in the various ætiological and clinical problems presented by this disease, and the remaining chapters in this classic work maintain the high standard set in previous editions.

[1] "The Treatment of Diabetes Mellitus", by E. P. Joslin, M.D., M.A., with the cooperation of H. F. Root, M.D., P. White, M.D., and A. Marble, M.D.; Sixth Edition, thoroughly revised; 1937. Philadelphia: Lea and Febiger. Medium 8vo, pp. 707, with illustrations. Price: $7·00 net.

## EYESTRAIN AND CONVERGENCE.

DR. N. A. STUTTERHEIM, of Johannesburg, has written a short book entitled "Eyestrain and Convergence".[1]

The subject of his thesis is, briefly, that an inadequate power of convergence produces eyestrain. The author has shown that the primary position of the eyes is one of divergence, not parallelism. This position is maintained by the elastic tissues around the eyes, and the extrinsic muscles act as tensors against this elastic pull.

When Stutterheim uses the term "convergence" he refers to the physiological movement which brings the dual eye to bear upon the object of attention. Thus convergence acts when the eyes are in any position. It is the "kinetic principle of binocular vision". He points out that while accommodation is an old phylogenetic function, convergence is young. Thus convergence is likely to be insufficient. An insufficiency of convergence, or "asthenovergence", causes eyestrain.

His treatment then proceeds physiologically. He "unfolds" the latent powers of convergence by a system that conditions the complex convergence reflexes. The principle of the treatment is for the patient to watch a test object while prisms of increasing power are placed before the eyes until diplopia occurs. He describes his methods in detail. Patients attend daily for a ten-minute treatment which consists of seven convergence movements. The latent convergence is developed until the normal of 50° of prism is reached. This usually takes about twenty-four treatments.

Stutterheim claims that this treatment often produces an enormous subjective improvement in his patients—not only as regards their eyes. Many are able to do without glasses which they had previously worn. He also describes an improvement in visual acuity which, he says, is due to a cure of partial amblyopia. Another interesting phenomenon is an improvement in the visual field. If we accept his thesis that inadequate convergence is the cause of eyestrain, then his methods sound ideal. A possible defect is the length of time taken for the treatment.

The book is well produced, and there is, besides detailed reports, an excellent summary in French, German, Spanish and Italian.

## ORTHOPÆDIC SURGERY.

A "HANDBOOK OF ORTHOPÆDIC SURGERY", by Alfred Rives Shands, is a well-written volume of 593 pages.[2] In this work the author has succeeded in the intention expressed in the preface of presenting for the consideration of the medical student and general practitioner the fundamental facts and principles of this subject. It is not an exhaustive treatise, but there is sufficient detail to give the reader a sound general idea of the condition described. The illustrations are good and the X ray reproductions are excellent, all having been redrawn to emphasize their characteristic features.

As explained in the preface, each chapter was sent to various authorities for criticism. As a result this book can be said to represent current American opinion on orthopædic surgery. An excellent feature of the book is the bibliography of 83 pages arranged in reference to each chapter.

This book can be recommended to practitioners as a clear, concise treatment of the subject of orthopædic surgery.

[1] "Eyestrain and Convergence", by N. A. Stutterheim, M.D.; 1937. London: H. K. Lewis and Company Limited. Crown 4to, pp. 100. Price: 7s. 6d. net.

[2] "Handbook of Orthopædic Surgery", by A. R. Shands, junior, B.A., M.D., in collaboration with R. B. Raney, B.A., M.D.; 1937. St. Louis: The C. V. Mosby Company; Melbourne: W. Ramsay (Surgical) Proprietary Limited. Medium 8vo, pp. 593, with 169 illustrations. Price: 30s. net.

The Medical Journal of Australia

SATURDAY, MARCH 12, 1938.

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## THE DIABETIC ASSOCIATION.

THREE years ago Mr. H. G. Wells wrote a letter to *The Times*, London, asking for funds to extend the Diabetic Department at King's College Hospital. The response was so spontaneous and favourable that it was obvious that a hitherto unexploited store of charitable feeling had been revealed. This realization, coupled with the patent need for a social organization specifically concerned with diabetics and their difficulties, soon led to the foundation of the Diabetic Association. This body consists essentially of diabetics, together with a sprinkling of medical practitioners, dietitians, almoners and others who are for one reason or another in daily contact with sufferers from this lifelong disorder. One of the most important objects of the association is the reeducation of all persons in the community, employers, school teachers, parents and others, as far as their outlook upon diabetics as a class is concerned. It seeks to spread the knowledge that diabetes is not the result of any faulty habits or indiscretions on the part of the patient, that it is not what is known as a socially unpleasant disorder, and that diabetics today are an efficient and employable group of persons. The effect of belonging to a well-organized diabetic family, facing a common difficulty with courage, confidence and success, confers an important benefit upon any diabetic's morale. In the practical sphere, instruction, hints and association news are conveyed to the diabetic by the splendid *Diabetic Journal*, a monthly periodical which flourishes under the editorship of Sir Hugh Walpole. The association provides information about the location of diabetic clinics and of boarding-houses where diabetics receive special consideration, about holiday camps for juvenile diabetics, about local sources of insulin and other diabetic equipment, about wandering (or district) nurses who visit the infirm diabetic, and about a dozen other important services to its members and others. The annual subscription for diabetics of better circumstances and for doctors is one guinea. Those who cannot pay this sum receive the journal and all other privileges of the association for two shillings and sixpence a year.

Shortly after the establishment of the Diabetic Association attention was drawn in these pages both to the organization and to *The Diabetic Journal*. It is perhaps unnecessary to remind medical practitioners that *diabetes mellitus* is the one disease that should be studied carefully by the person afflicted with it—on the patient's understanding of the disease and on his intelligent cooperation in treatment will depend his health and happiness and his usefulness as a member of the community. The medical practitioner has been well catered for by the writings of R. D. Lawrence in England, of E. P. Joslin in America, and of W. W. Ingram in Australia. Among the useful books for study by patients are: "The Diabetic Life" and "The Diabetic A B C", published by Lawrence in England; "A Diabetic Manual", published by Joslin in America; and "So I'm a Diabetic", published by Madeleine Scott in Sydney. But books are not entirely sufficient either for medical practitioners who wish to control their patients and to endow them with hope, or for the patients who need to understand and to take an active part in their own treatment and to overcome a natural feeling

of despair at the discovery of their affliction. The last-mentioned need is most important and is largely met by the Diabetic Association and its journal. While there is a sprinkling of members of the parent association in Australia, it is obvious that the great distance from the association headquarters and the different conditions must rob Australian diabetics of the full benefits of membership. For some time a few medical practitioners in the several capital cities have wished that some branch of the association nearer home could supply Australian diabetics with information and social care of the type described. To this end a meeting of medical practitioners, almoners, dietitians and diabetics was recently called in Sydney, and a provisional committee was elected to take steps to form an Australian branch of the Diabetic Association. The committee is a representative one and includes some prominent citizens, both diabetic and non-diabetic, besides dietitians and other diabetic workers. No medical men are included in the committee, although a small medical advisory committee will be desirable. At the meeting the Minister for Health for New South Wales expressed a lively interest in the movement and suggested that if he was approached by the association funds for diabetic research might be made available at certain approved diabetic clinics.

It is to be sincerely hoped that such a promising social service will receive the support from the profession which its excellent programme deserves, and which has been shown in Great Britain to be indispensable for its effectual prosecution.

## Current Comment.

### VITAMINS AND CANCER.

J. R. Davidson has already, in previous investigations, observed that tumour growths can be produced by tar irritation, that mice with tumour growths display impairment of normal reproduction, and that when mice are fed on a diet richer in vitamins than the ordinary diet the growth of tumours appears to be retarded and the average length of life somewhat increased. He now describes an attempt to inhibit the development of tar carcinoma in mice and records the effect of vitamins on the tumour threshold.[1] In the present study Davidson endeavoured to follow up the observations on vitamins by employing a synthetic diet. He considered it advisable also to use a control synthetic diet which would produce an animal as closely as possible the facsimile of the original parents. Davidson used a control diet similar to Evans's "E"-free diet, with half an ounce of wheat germ oil added. To the high vitamin content diet three drachms of a highly concentrated vitamin *A* (30,000 international units per gramme) were added. The higher vitamin content diet was similar to the control diet, except that vitamins *A*, *B* and *E* were increased and the lard was slightly reduced. The animals used for the study were bred from two mice which on biopsy had displayed the presence of tar carcinoma. The offspring were divided into seven divisions and were bred and raised differently. Divisions I and VII were treated with tar to produce tumours and then bred. The reason for this was to retain control mice whose standard of anatomical structure and physiological function would, as closely as possible, represent the original mice of the series. It was noted that when the offspring was subjected to the same internal and external environmental conditions as the parent, the same standard of resistance to tumour formation was maintained. In Division II there was no mating. Later the male was replaced by the tarred male in Division I, there being no corresponding male available. It was considered advisable, if possible, not to raise the standard of physiological function of the animal, so that the second generation of Division II was dropped from a tarred male and untreated mothers. There were enough females in the offspring dropped to divide, and these were used in this series. The remaining divisions (untreated mice) were permitted to breed naturally, so that by the time the offspring of Divisions I and VII (controls) were ready for the series, from two to four generations had been dropped from Divisions II, III, IV, V and VI. The last generation of the divisions was divided into two groups, (*a*) and (*b*). Group (*a*) was placed on control diet and Group (*b*) on the diet with higher vitamin content. All mice were tarred every third day for twenty-seven tarrings. This was considered to be about the amount of tar irritation necessary to produce growths in this strain of control mice.

Thirteen days after the final tarring growths were sufficiently developed in the control mice, Group (*a*) of Division I and Group (*a*) of Division VII, to be removed for biopsy. Unfortunately, in Division I, Group (*a*), there were only four mice left, as all the others except one were destroyed by vicious mice in the group. Another mouse was killed by the others the day following the biopsy, and the remaining three were placed in separate pens. Biopsy of all four demonstrated Grade I epidermoid carcinoma. Except in one, the growths in Group (*a*), Division VII, showed marked differential changes towards epidermoid carcinoma. The few

[1] *The Canadian Medical Association Journal*, November, 1937.

growths that developed in other groups were quite small. Davidson gives a detailed table recording the number of growths found in each group, the histological findings and the number of remaining mice. A few mice died, as explained in the text. Most of the deaths occurred during hot days. It was noted that there was difficulty in preventing male mice from fighting.

In these experiments it was early noted that impairment of reproduction occurred amongst mice under treatment which developed tumour growths. When the mice with tumours were put on synthetic diets, it was found that not a single vitamin alone, but a combination of vitamins, with increased dosage, was necessary to maintain normal reproduction; and when the vitamin dosage was increased tumour growths among mice under treatment appeared with much less frequency. The control diet produced healthy, normal mice. If the mice were bred untarred there was a slight tendency to raise the tumour threshold in Group (*a*), Division II. When the tumour threshold was raised, as in Group (*a*), Divisions III, IV, V and VI, few growths appeared on the control diet. When the tumour threshold was reduced or maintained at a lower standard, this diet would not protect the animal from cancerous growths. Accordingly the dosage of vitamins in the diet had to be increased proportionately to the amount of treatment given or the tumour threshold standard possessed by the animal at the beginning.

Davidson informs us that growths that appear in mice on the higher vitamin diets generally resemble warty growths, with little or no thickening of tissue at the base attachment, and are unlike those found in mice on lower vitamin diets. In the latter the growths usually have a thickened and indurated base. Some growths appear to become quiescent later and remain so. Others become dark on the surface and subsequently disappear. Some mice, trying to remove the growth, maintain a constant irritation by scratching; others endeavour to remove the growth with their teeth. When the surrounding tissue becomes damaged, infection of the growth occurs frequently in mice on the lower vitamin diets, but is rarely seen in those on higher vitamin diets. Growths appearing in the early stages of these investigations almost always progressed to carcinoma. Davidson gives full details of all his findings. He found that in a few mice, that had been on a low vitamin diet, had well-developed tumour growths and were subsequently placed on a diet with greatly increased *A*, *B* and *E* vitamins, the smaller growths became darker on the surface, and the indurated tissue at the base of the hyperkeratosis type of growth became soft and easily detached, leaving a raw surface with apparent healing efforts at the surrounding edges.

Davidson, after his observations of more than 600 mice, extending over six years, considers that it is fairly well demonstrated that the tumour threshold of the mouse can be lowered by tar irritation and raised or maintained at a fairly constant level by breeding and diet, with varying doses of vitamins in the diet, and more particularly those vitamins which are associated with reproduction. He admits that there is very much to be learned yet, but meanwhile his contribution is of great value. He particularly inquires whether the present vitamin dosage of the high vitamin diet will maintain the animal throughout life or will need to be increased with age.

## IMMUNITY IN PROTOZOAL DISEASES.

Persons may harbour malaria parasites without having symptoms of malaria. Infection with *Entamœba histolytica* may occur without causing dysentery. It has been suggested that in most protozoal diseases there is no immunity comparable with the immunity against bacteria, but rather that there may be a high degree of natural or acquired resistance. On the other hand, persons who have recovered from kala-azar or oriental sore acquire a long-standing or even permanent immunity. But H. E. Shortt, S. R. Pandit, K. P. Menon and C. S. Swaminath suggest that the immunity in these instances is due to the persistence of infection in the skin and that the transience of the immunity in certain bacterial diseases is due to the complete disappearance of the infecting organisms from the body.[1] Evidence in favour of their views on immunity in protozoal diseases was obtained by inoculation of dogs with *Babesia canis*, and monkeys with *Plasmodium cynomolgi* and *Plasmodium knowlesi*. Dogs cannot readily be superinfected with *Babesia canis*; but Shortt and his collaborators found that once the original infection had been eradicated, no evidence of immunity remained. Monkeys infected with *Plasmodium cynomolgi* are acutely ill for about eleven days, after which they pass into a stage of "latent" or "chronic" infection. Monkeys in this stage were reinfected; but the incubation period was longer and the illness milder. Four monkeys that had been cured were reinfected. The incubation period was the same as in the control; but the period of heavy infection was shorter. Unfortunately only one control monkey was used. Of two monkeys with "latent" infection with *Plasmodium knowlesi*, one died after superinfection; the other survived. One of four that had been cured died after reinfection; the other three survived. Shortt and his collaborators were not satisfied with the test of cure in this series. They then experimented with twenty-six monkeys that had all been infected with *Plasmodium knowlesi* three to five months earlier and had been thoroughly treated over a period of 27 days and had been apparently cured for over a month. All were reinfected. In some instances the infection was heavier, in others milder, than the original infection. They conclude that "immunity to these parasites is dependent on their continued existence in the host's body"—a reasonable inference.

[1] *The Indian Journal of Medical Research*, January, 1938.

# Abstracts from Current Medical Literature.

## THERAPEUTICS.

### "Mapharsen."

B. Appel (*The New England Journal of Medicine*, December 16, 1937) discusses the use of "Mapharsen", an arsenical preparation which was known to Ehrlich in 1912 as "arsenoxide". Twenty-eight patients, who suffered from various forms of syphilitic cardio-vascular disease, were treated with this drug. Twenty to forty milligrammes were given as a dose, and approximately twenty doses were given to each patient. Twenty-six of the patients had previously been treated with bismuth or with arsenic in the form of "Tryparsamide" or neoarsphenamine. Of the twelve patients who had previously received neoarsphenamine, six had had reactions. These six patients had no reactions after "Mapharsen". Two patients had slight nausea after neoarsphenamine and also after "Mapharsen". Two patients developed jaundice and toxic hepatitis. One of these was treated with "Mapharsen" and sodium dehydrocholate without ill-effects. Twenty-two patients felt a definite improvement. Chest pains decreased, and appetite and sleep improved. None of these patients suffered from a failure of compensation. Aortitis, aneurysm and aortic incompetence were the diagnoses; and in 13 cases the electrocardiograph gave evidence of myocardial damage. As a rule, in such cases as those referred to, only subjective improvement can be observed. Such improvement was usually noted in these cases, but the author admits that it takes many years to evaluate the results of treatment with an arsenical preparation. As a rule, treatment of cardio-vascular syphilis is begun with a course of mercury, bismuth and iodides for a month or more, because of the danger of reactions from arsenicals. "Mapharsen" appeared to be less toxic than other arsenical preparations.

### The Toxic Manifestations of Sulphanilamide Therapy.

In discussing the therapeutic applications of the sulphanilamide group, Perrin H. Long and Eleanor A. Bliss (*Annals of Internal Medicine*, October, 1937) point out the dangers in the careless use of these powerful chemotherapeutic agents. The most serious manifestation is that associated with the hæmatopoietic system. Seven patients developed acute hæmolytic anæmia, characterized by a sudden fall in the hæmoglobin and red cell count, and the appearance of macrocytosis, anisocytosis, poikilocytosis, elevated white cell counts, nucleated red cells and large numbers of reticulocytes in the peripheral blood; six of these patients were jaundiced, and in all a urobilinuria was present. All patients recovered, but only with the help of blood transfusions. The mechanism of production of this anæmia is not yet known; it does not seem to be a true idiosyncrasy, and there is no correlation between the amount of sulphanilamide administered and the development of anæmia. Another severe toxic effect is the development of granulocytopenia, which may be fatal. Test doses may not produce the effect, and it seems, therefore, that the mechanism of its production is different from that involving amidopyrine. Mild clinical toxic effects are sometimes induced in ambulatory patients; such symptoms as slight dizziness and mild nausea are described, and fever and morbilliform rashes are noted. When skin eruptions are seen, therapy should be discontinued and the rash and fever will disappear in forty-eight hours. There is a fall in the carbon dioxide combining power of the blood in practically every patient on therapeutic doses. Clinical acidosis with air hunger has been seen, and it is suggested that ten grains of bicarbonate of soda should be administered as a routine with every dose of sulphanilamide. No evidence of renal irritation has been observed by these writers, although caution is advised in cases of renal insufficiency. Sulphæmoglobinæmia is another toxic manifestation, the associated administration of saline carthartics being apparently a contributory factor. Large amounts of fluid act as an antidote in patients suffering from the acute toxic manifestations of sulphanilamide therapy, as the chemical is excreted with water.

### Splenectomy in Purpura Hæmorrhagica.

Maxwell M. Wintrobe (*The Journal of the American Medical Association*, October 9, 1937) has investigated the course of sixty-two patients suffering from *purpura hæmorrhagica*, nineteen of these being subjected to splenectomy. They all presented the phenomena of abnormal bleeding or bruising, or both, petechiæ, diminished numbers of platelets, prolonged bleeding time, non-retractility of clot with normal clotting time, positive reaction to the tourniquet test and, in more recent cases, a positive reaction to the moccasin venom test. The course of the condition is extremely variable; the first manifestations may be mild or fulminating; the initial symptoms may disappear, never to recur, or they may progress without interruption. Recurrences may occur at unpredictable times and may be more or less serious than the original episode. It is impossible to forecast the subsequent progress of a given patient. Medical treatment with blood transfusions, ultra-violet irradiation and deep X ray therapy to the spleen, iron in the subsequent anæmia, and snake venom were given to forty-three patients. Continuation of the immediate recovery occurred in only 30%, relapses taking place within four years in the majority of instances. After splenectomy there was a higher percentage of continued recoveries, even allowing for the fact that 20% of patients died after operation. In view of the uncertainty of the course of the condition, any evaluation of a line of therapy is difficult. Splenectomy, whilst being the most radical method of treatment, is nevertheless decidedly the most effective of the therapeutic methods so far proposed. There are, however, definite indications for the operation suggested by the writer: severe bleeding which more conservative measures have failed to remit; the fact that females are more inclined to relapse than males, and that therefore sex must be an indication; interference with the growth and development of the patient, even if the hæmorrhage is only mild.

### Intravenous Administration of Guaiacol in Lung Abscess.

In view of the knowledge that creosote, guaiacol and their derivatives have an almost specific action on the secondary infection occurring in open pulmonary tuberculosis but no beneficial effect on the tuberculosis itself, and also since there is very little medical treatment available in the early weeks of an acute lung abscess, Charles H. Nammack and A. M. Tiber (*The Journal of the American Medical Association*, July 31, 1937) undertook the study of the effects of guaiacol on the course of acute and chronic non-tuberculous lung abscess. The only method of approach to the lung by guaiacol is by the subcutaneous or intravenous route. The former method of administration is sometimes irritating, and therefore the intravenous injection is to be preferred. It was determined by exclusion that the most suitable preparation for administration was as follows: a solution of 0·3 to 0·6 gramme (five to ten grains) of guaiacol, 2·0 cubic centimetres of ethyl alcohol, and 18·0 cubic centimetres of water containing 0·15 gramme (two and a half grains) of sodium iodide; this solution is stable if kept in a dark container. After the intravenous injection of the above solution it was determined that the sputum of patients with lung abscess contained for a period of forty-eight to seventy-two hours a substance which gave a positive reaction with Millon's reagent. A specified routine was adopted for the care of the twenty patients whose case histories are reported in this article. It includes an intravenous injection of the guaiacol solution every third or fourth day until the amount of sputum was reduced, its foul odour had disappeared, and the general condition of the patient improved. It was found that the patients felt better in a very short time, owing to the subsidence of the fever and cough and to the decrease of the daily sputum output and the loss of its foul odour. Serial skiagrams showed early regression of the large area of pneumonitis surrounding the abscess cavity and later

its actual disappearance. It is felt that the eradication of all foci of infection about the nose, mouth and throat, and moderate restriction of all activities until the radiogram shows complete healing are essential if the results of this type of treatment are to remain permanent. As the intravenous use of guaiacol causes early subsidence of the symptoms and a regression of the pathological condition in the lung without producing any unfavourable reactions, it appears that this type of therapy should be used more extensively in the treatment of acute and chronic lung abscess.

## NEUROLOGY AND PSYCHIATRY.

### Changes in the Brain in Accidental Electrocution.

GEORGE B. HASSIN (*The Journal of Nervous and Mental Disease*, December, 1937) presents the histopathological study of a man, thirty-five years of age, who was found dead between the railroad tracks of an elevated electric railroad station near Chicago. Changes in the brain and its coverings are described in detail. While hæmorrhages are not commonly found after death from electrocution, typical changes are in the form of tears of the cerebral tissues, shrinkage around the smaller blood vessels and the glia nuclei, and rupture of the tunics of the larger blood vessels, especially the *membrana elastica*. The author believes the last-mentioned finding to be pathognomonic of electrocution. He discusses the histological differences seen in cases of accidental and legal electrocution, and believes the reason for such differences to lie in the fact that in the latter case the electric current is brought into closer contact with the body and that in passing from the forehead to the lower extremity it invariably involves the brain.

### The Neurological and Psychological Effects of Hypoglycæmia.

D. N. PARFITT (*The Proceedings of the Royal Society of Medicine*, December, 1937) summarizes in detail the neurological and psychological effects observed during the treatment of schizophrenic patients by insulin hypoglycæmia. He also comments on the variations in the order and appearance of the signs of hypoglycæmia. Among the complications liable to arise in the course of this method of treatment, he mentions what is termed the "dry shock", that is, the complete absence of sweating before the onset of coma, which appears greatly to increase the liability to dangerous complications, particularly to epileptic attacks. He noted that the conjunctival reflex disappeared first at the corners of the eye, and the responsive area shrank contralaterally until it finally disappeared at the corneal edge. He is unable to agree with Sakel that if the patient is quiet when the shock is terminated, he will be quiet all day, and *vice versa*. Nor has he noticed any lucid interval developing in the pre-coma stage. He believes the epileptic convulsions which may arise as the result of insulin are of two kinds: one comparable with idiopathic epilepsy and developing while the cortex is experiencing metabolic changes and is still irritable, and the other group appearing during coma when the cortical functions are inhibited—the medullary fits. He mentions the occasional slow recovery of consciousness and the transition from coma to rousable stupor, which may persist for hours and even days after the giving of glucose. This condition is not due to any deficiency in blood sugar, and the explanation for it has not been found. Parfitt believes that the pathology is to be found in some disturbance of the carbohydrate metabolism of the brain cells, as the manner in which some of the signs and symptoms resemble those of *encephalitis lethargica* seems to suggest an involvement of extrapyramidal centres in the mid-brain. The article closes with a discussion on the therapeutic mode of action of insulin hypoglycæmia, the writer pointing out how, through the stimulation of its antagonists, insulin acts as a powerful glandular stimulant, and that it has in addition a specific vagotropic action on the vegetative centres.

### The Irritative Treatment of Schizophrenia.

EMERICK FRIEDMAN (*The American Journal of Psychiatry*, September, 1937), using a technique which he has modified from Meduna, discusses the irritative treatment which he carried out upon twenty schizophrenic patients. On the assumption of a "biological antagonism" existing between epilepsy and schizophrenia, the author sets out to induce a temporary epileptic state; but whereas Meduna relied upon intravenous injections of "Metrazol" ("Cardiazol"), given twice a week, the author uses in addition to the "Metrazol" a number of other accessory methods. He so arranges the diet and gives 1·3 grammes of sodium bicarbonate three times a day that the urine is made alkaline. He increases the fluid intake, setting the minimum at two litres per day, and gives no sedative during the whole course of the treatment. A freshly prepared sterile solution of 25% camphor in oil is injected intramuscularly twice a day in an initial dose of 16 cubic centimetres, which may be increased up to 56 cubic centimetres. The "Metrazol" injections are given intravenously every other day, a start being made with 5 cubic centimetres of a 10% aqueous solution, and the dose being increased up to 16 cubic centimetres if necessary. When camphor is used, convulsions from fifteen minutes to three hours after injection and as many as six individual convulsions have been noted. An injection of "Metrazol" produces only one convulsion. The doses of both drugs vary with the individual needs. All manner of seizures were observed, from transient *petit mal* to epileptic equivalents and "twilight states". The obnoxious effects of camphor were nausea, emesis, mild ataxia and malaise. By this combination of methods the author endeavours to establish an irritative threshold on which to impose the deliriform and convulsive states from which beneficial results may be obtained. The complications of the treatment are few, and dangers seem no greater than in the original Meduna method. As contraindications to this newer method of treatment the author sets down failing or decompensating cardio-vascular system, any acute febrile illness, menstruation, severe anæmia or cachexia, any abnormality of the blood or urinary constituents, or a previous history of cranial injury with subsequent unconsciousness. Twenty schizophrenic patients, whose condition was of varying type and duration, were treated by this method. Fifteen were sufficiently recovered to leave hospital (two subsequently relapsed through insufficient treatment); two showed some improvement and three remained unimproved.

### Hypnosis.

JAMES L. MCCARTNEY (*The Journal of Nervous and Mental Disease*, October, 1937) defines hypnotism as the induction of hypersuggestibility, and finds it a rational form of psychotherapy in the treatment of the psychoneuroses. He deplores the fact that the medical profession generally is very reticent in accepting hypnosis, and that in the past it has been associated with charlatanism. He gives a brief historical *résumé* of hypnosis in the hands of many celebrated neurologists and physicians in the past. He admits that it deals with symptoms rather than with causes, and is therefore less radical in its effects than psychoanalysis; but at the same time it is often more applicable than analysis, and in its relief of symptoms frequently becomes a valuable prelude to some recognized form of mental analysis. The mechanism and technique of hypnosis are fully discussed. Comment is passed upon certain failures and the dangers of hypnotism being undertaken by the unscrupulous and unqualified, the greatest danger lying in the physician's becoming unscrupulous in the presence of opportunity. The paper contains nine case reports, showing the value of hypnosis in relieving the distressing symptoms evidenced in the psychoneurotic. The author claims that the patient's recollection of suggestions occurring during the hypnotic sleep is approximately inversely proportional to its depth. This amnesia may not remain. Hypnosis may be used to facilitate the beginning of mental catharsis; it is of the utmost value in overcoming functional symptoms and is often a useful adjunct to other forms of psychotherapy.

# British Medical Association News.

## SCIENTIFIC.

A meeting of the New South Wales Branch of the British Medical Association was held on October 28, 1937, in the Robert H. Todd Assembly Hall, British Medical Association House, 135, Macquarie Street, Sydney, Dr. L. A. Dey, the President, in the chair.

### Pyelitis.

Dr. Edgar Stephen read a paper entitled "Pyelitis in Children" (see page 485).

A paper by Dr. T. Dixon Hughes, entitled "Pyelitis in Pregnancy", was read in his unavoidable absence by Dr. R. Jeremy.[1]

Dr. Hughes began by stating that pyelitis in pregnancy should be regarded from a different angle from that of the non-pregnant patient. He would almost say in considering pyelitis that pregnancy was one of the predisposing causes.

The factors which pregnancy introduced were three in number: (*a*) the direct pressure effects of the uterine contents on the ureter; (*b*) the alteration in structure and length of the ureter during pregnancy; (*c*) the variation in tone of the unstriped muscle of the ureter throughout pregnancy and the puerperium.

Dr. Hughes reminded his audience that the right ureter crossed over the iliac vessels at the pelvic brim almost at right angles, and it was therefore more exposed than the left ureter, which was protected to some extent by the promontory of the sacrum and the sigmoid colon, which lay anterior to it. For this reason it was to be expected that the right ureter would show more signs of obstruction than the left; this was in accordance with clinical facts, as pyelitis was more common on the right side than on the left. Not only pregnancy, but an ovarian cyst of a large size would cause obstruction identical with that caused by pregnancy. Dr. Hughes had at hospital a pyelogram well illustrating this fact. By means of pyelography, retrograde pyelography, examination of *post mortem* specimens and by measuring the intraureteric pressure at different levels with a ureteric catheter connected to a recording drum, Dougald Baird had shown that the site of obstruction caused by pressure was at the pelvic brim.

The musculature of the ureter was composed of unstriped muscle, the tone of which was affected by the amount of œstrin circulating in the blood. Œstrin did not reach a comparative high level till after the sixth month, and then rapidly increased till term. It was held that the increased tone of the ureter, with its more active peristalsis, was able to overcome the partial obstruction, whereas the rapid fall of œstrin in the puerperium left a toneless inactive ureter leading to stasis, although the obstruction was no longer present.

C. K. Smith and M. F. Ockerblad, working with dogs, had found lengthening of the ureter after causing partial obstruction by ligature. This lengthening developed very quickly and was followed by kinking of the ureter as the only mechanical means of absorbing the extra length between two comparatively fixed points. These experimental results of partial obstruction in dogs were similar to those occurring in women in the second half of pregnancy. It was interesting to note that histological examination of the ureter failed to reveal any compensatory increase in the musculature of the ureter above the obstruction. This kinking of the ureter during pregnancy was therefore the result of the dilated lengthened ureter, which had mechanically to keep the same distance between two fixed points, the kidney and the obstruction at the brim.

Before leaving the question of obstruction, Dr. Hughes remarked that it was to be noted that obstruction was more likely to occur in *primiparæ* than in *multiparæ*. The explanation for this was that the tight abdominal muscles of the former more effectively compressed the uterus against the ureter than those of the more lax *multiparæ*.

A point had occurred to Dr. Hughes as to what effect tight abdominal corsets had in this regard. They had seen that pressure of the pregnant uterus had two main effects: (*a*) stasis by direct pressure, (*b*) stasis by kinking of the lengthened ureter. These changes were normal and occurred without any pathological symptoms, but, like most things in nature, this normal condition required very little to become pathological, and the obstruction might be such that dilatation of the ureter and pelvis of the kidney went on until the kidney was almost destroyed. This state of affairs was not reached till very definite changes had taken place in the urine; but it was an insidious state, and the ultimate destruction of the kidney had to be borne in mind whilst the progress of a patient with chronic pyelitis was being watched. One such case had come under Dr. Hughes's notice, with complete destruction of the right kidney and great dilatation of the left. Another point of interest that had been determined was the fact that the peristaltic action of the ureter was in direct proportion to the amount of fluid passing through it, and therefore stasis was overcome to some extent by copious fluids.

It should be emphasized, Dr. Hughes continued, that although obstruction at the pelvic brim was the most common predisposing cause of pyelitis in pregnancy, unfortunately the pregnant woman was no more immune than her non-pregnant sister from the other cause of pyelitis. A stone in the ureter or kidney was often found to be the cause of a persistent pyelitis, especially one failing to clear up after delivery. Other predisposing causes, such as constipation, septic teeth, septic tonsils, were all factors which might lower the patient's resistance and turn the scale from a normal to a pathological state.

If Dr. Hughes had dwelt unduly long on the changes that occurred during pregnancy, it was in the hope that they might more scientifically attack and appreciate what they were trying to do, rather than that they should rely on the latest urinary antiseptics.

Discussing the bacteriology of the condition, Dr. Hughes remarked that this aspect was of more importance than was realized, as the time had arrived when the method of treatment should be aimed at the particular organism involved, and that reliance should not be placed on a cure-all. A typical example was the futility of alkalis in the treatment of infection by the *Bacillus proteus*, a urea-splitting organism producing an intensely alkaline urine. The most common organism was *Bacillus coli communis*, which caused about 90% of infections. *Bacillus proteus* had already been mentioned; amongst other organisms, *Bacillus lactis aerogenes*, *Staphylococcus aureus*, *albus* and *citreus*, and *Streptococcus fæcalis* had to be included.

Dr. Hughes then referred to the differential diagnosis. There were two main conditions for differential diagnosis: appendicitis and pelvic conditions. The latter included salpingitis, torsion of the tube and ovary, a pelvic appendix.

The most common difficulty was that of differentiating between pyelitis and appendicitis. Pain in the iliac region was extremely common during pregnancy. Whether this pain was due to a loaded caecum or to obstruction of the ureter was hard to determine; but in the patient's mind there was a constant fear of appendicitis. A careful examination and reassurance were a great relief to the patient. When, however, there was much tenderness and a rise of temperature the diagnosis was somewhat difficult. It was well to remember that a few pus cells and the discovery of organisms in the urine did not exclude appendicitis, nor did these findings do away with the necessity for a very careful clinical examination. The points of difference were that in pyelitis the temperature was higher, there was absence of the furred tongue and offensive breath, vomiting was not common unless pain

[1] Dr. Hughes's paper was illustrated by pyelograms prepared by Dr. D. G. Maitland.

was very severe, the urinary findings were usually quite definite and the tenderness was more in the loin. The points in favour of appendicitis were lower temperature and localized rigidity. One of the most reliable signs from Dr. Hughes's own observation was that in pyelitis the uterus might be moved from side to side without causing pain, whereas attempting to move the uterus caused considerable reaction in inflammatory conditions. The urinary findings were negative or perhaps a few pus cells and organisms might be present; but since at least 40% of hospital patients had a few pus cells and colon bacilli in the urine, it was obvious that the urinary examination would not replace a thorough clinical examination. Pelvic conditions had very much the same points of diagnosis; with salpingitis, however, the temperature might be very high, but a pelvic examination would usually point to some pelvic condition. Acute pain in the right iliac region late in pregnancy might be due to a torsion of a tube; the differential diagnosis between this and appendicitis was outside the scope of Dr. Hughes's paper. Amongst the other pelvic conditions a pelvic appendix had to be considered, and this might perhaps be more easily excluded by rectal than by pelvic examination.

In the puerperium such conditions as parametritis, metritis, thrombosis of pelvic veins, and pelvic peritonitis had to be excluded before the temperature and tenderness were attributed to pyelitis.

Treatment might be divided into: (*a*) efforts to overcome obstruction, (*b*) drug treatment. The former included: (i) catheterization of the ureter, (ii) increasing peristalsis by copious fluids, (iii) posture. The latter included (i) alkaline treatment, (ii) mandelic acid therapy, (iii) the administration of sulphanilamide. Unfortunately it was impossible to remove the fundamental cause, which was stasis. At first sight catheterization of the ureter appeared to overcome the difficulty, but its effect was only temporary, and it could not permanently overcome kinking and dilatation; it gave best results when pain was severe and dilatation appeared to be extensive. If the catheter was left in for some days, it occasionally tided the patient over till other measures controlled the condition; it was, however, up to the present, in the experience of most a disappointing procedure; it occasionally gave dramatic results.

Fashions changed. Twelve years previously the theory of obstruction had been ridiculed, and Dr. Hughes well remembered being chided on several occasions for making his patients adopt the knee-chest position or crawling position, or even with hips and breasts supported on pillows, in order to allow the uterine contents to fall forward and relieve the pressure on the ureters. This had been adopted for those patients confined to bed, and with other treatment appeared to give good results. It was certainly a logical method and, in the opinion of Dr. Hughes, a useful one.

Referring to drug treatment, Dr. Hughes pointed out that it had been wisely stated that no treatment was of much use unless "mixed with brains in its administration". In the acute case alkalis, in Dr. Hughes's opinion, still held pride of place if they were given in sufficient doses to render the urine sufficiently alkaline. Potassium citrate and bicarbonate of soda were the most suitable forms. When the patient was intolerant of potassium citrate, magnesium carbonate and bicarbonate of soda were useful, or smaller doses of potassium citrate, such as twenty grains with fifteen grains of bicarbonate of soda flavoured with neutral syrup of lemon, every hour, might be successful. Copious fluids were used throughout. Whatever dosage or method was adopted, the urine should be tested once a day at least, preferably twice a day (this could be done by the patient), to see that it was alkaline throughout the twenty-four hours. Early treatment, together with copious fluids, would ensure an abatement of symptoms in the majority of patients. Before discussing other drugs Dr. Hughes wished it to be understood that only when the simple ordinary methods had failed did he advocate the employment of other drugs. It was desirable before commencing any other line of treatment to be aware of the organism concerned.

This brought Dr. Hughes to mandelic acid therapy. This drug, which replaced the ketogenic diet, had a definite place in the treatment of pyelitis of pregnancy. It was of greatest use in the most chronic type in which excellent results were sometimes produced. It was particularly effective in a *Streptococcus fæcalis* infection which was resistant to other antiseptics, including sulphanilamide. No results could be expected unless certain rules were carried out. First, the concentration in the urine should be between 0·5% and 1·0%, and, secondly, the pH should not be greater than 5·4. The first could be obtained with a normally functioning kidney, since mandelic acid salt was almost quantitatively excreted in the urine. The concentration could be kept up to 1% by administering 12 grammes of mandelic acid per day if the urine output was kept down to 1,000 cubic centimetres.

If required, the necessary acidity could be obtained by the addition of ammonium chloride or ammonium nitrate. If, however, *Bacillus proteus* was the causative organism, the necessary acidity would not be attained. Although the urine was rendered sterile frequently within a few days, there was a tendency for the organism to return on cessation of treatment. This was usually not associated with any clinical symptoms. Dr. Hughes had found mandelic acid most useful in the ambulatory patient with a well-marked bacilluria but few symptoms. Mandelic acid therapy, accurately administered, was a useful method of treatment in pyelitis of pregnancy, and was specific for the *Streptococcus fæcalis* which had resisted alkalis and sulphanilamide.

Dr. Hughes then referred to sulphanilamide. He was aware that this drug might cause anæmia, sulphæmoglobin agranulocytosis, optic neuritis and skin eruption. He was also satisfied that it would render the urine sterile when infected with *Bacillus coli communis*, *Bacillus proteus*, and, according to the literature, staphylococci, but not *Streptococcus fæcalis*.

At this stage Dr. Hughes referred to a patient who had had all the usual treatment, including ureteral catheterization for weeks; in view of her very serious general condition, induction of labour had been decided upon. Permission was granted before the induction was carried out to try sulphanilamide, and within a few days the urine was sterile and the patient was demanding more food.

Although the series of cases in which it had been used was small, the results were definite. At Crown Street Hospital they had used this drug extensively in streptococcal infections without any complication beyond sulphæmoglobinæmia; it was then decided, in view of the less serious nature of the complaint, to refrain from using a large dose for more than a few days. The technique was to give about 4·0 grammes for three to four days and then to reduce the dose to 1·5 grammes by the fourth day, when the urine was usually sterile. The patients were kept on the treatment for seven days in all and then were changed to mandelic acid. On the cessation of treatment there was a tendency for the organisms to reappear in the urine without symptoms. In one acute case the patient was having rigors and the symptoms disappeared in twenty-four hours. This was an investigation to confirm overseas reports as to the efficiency of the drug in rendering the urine sterile of organisms in a comparatively short space of time. This Dr. Hughes believed it would do in contradistinction to all other urinary antiseptics except mandelic acid. But whether its employment was justifiable was quite a different matter. Dr. Hughes thought that the matter could best be summarized thus: First, alkaline therapy should be given a fair trial unless *Bacillus proteus* was the causative organism. If this organism was responsible it was necessary to proceed to the third step. The second step consisted of mandelic acid therapy with proper technique. In the third place, if there was no improvement, and then only, Dr. Hughes thought that the employment of sulphanilamide with adequate safeguards, such as progressive blood counts, was justified, but if no improvement had taken place within seven days it was unwise to go on.

A drug which prevented the necessity of an induction of labour was not to be disregarded without much thought. And much thought and investigation were the keynote of treatment of pyelitis.

In his concluding remarks Dr. Hughes thanked the members of the honorary medical staff for allowing him access to their patients.

DR. A. J. GIBSON said that he was most interested in Dr. Hughes's paper and was in agreement with him. One line of treatment that was very useful had not been mentioned, and that was the use of eserine sulphate in pyelitis of pregnancy. It had first been used by Dr. Harry Harris, and often gave dramatic results. The dose was one one-hundredth to one-sixtieth of a grain every twenty-four hours, and in simple cases the results were surprising. Dr. Harris contended that if there was no response to the administration of eserine sulphate, then organic trouble was usually present. Dr. Gibson quoted the case of a woman whose only symptom was slight tenderness over the right kidney and who had suddenly developed pain at night. The pain became severe and lessened, became severe and lessened again, the temperature rose, and the patient was very sick. Dr. Gibson asked Dr. Harris for a consultation. Dr. Harris suggested first giving the patient eserine sulphate. The result was a dramatic recovery, sudden and complete. Dr. Gibson used eserine as a routine measure afterwards. He advocated using all other treatments, such as posture and hot packs, but believed that eserine sulphate should be tried first. When pronounced kinking and dilatation were present, the patients sometimes did not respond, and in these circumstances a ureteral catheter should be passed. If there was no response in severe cases within a few days, then termination of the pregnancy was indicated. In the majority of patients with pyelitis the blood pressure was low, and patients with good pressure did not so often contract pyelitis.

DR. H. A. RIDLER entered a plea for more accurate diagnosis. The general surgeon was inclined to say "appendicitis" when the urologist said "pyelitis". Referring to a case, Dr. Ridler said that he had been called to see a patient who was believed to be suffering from acute appendicitis. He found the urine to be loaded with pus, and the diagnosis was obvious. Pyelitis in the puerperium and *post partum* pyelitis were not common; they were terms, however, that were often used. Pyelonephritis was a nicer term to use than puerperal sepsis.

DR. RALPH WORRALL congratulated the speakers on their papers, and asked Dr. Stephen whether he would elaborate the diagnosis in small children of about a year old. He did not agree with the idea of confining small children in binders. If pyelitis was not an ascending infection, why should such elaborate precautions be taken? Dr. Worrall wondered how it was possible to collect specimens of urine from such young children. The pyelitis of pregnancy was due to stasis and was rather like toxic albuminuria; both had a tendency to relapse in subsequent pregnancies, and both permanently damaged the kidney. He therefore terminated the pregnancy rather than risk the woman's life. The Mayo Clinic had reported that 10% of patients were liable to suffer from serious symptoms after the administration of sulphanilamide. He often advocated posture, but it was not necessary for patients to crawl. The adoption of Sims's position would meet most cases.

DR. LORIMER DODS said that his experience of sulphanilamide as a urinary antiseptic in children had been limited to two cases, in both of which the patients had shown an excellent response. Helmholz, of the Mayo Clinic, who was one of the first to use sulphanilamide in the treatment of urinary infections of childhood, had published records of a number of children who had been successfully treated with this drug during the past year. Helmholz had pointed out that the dosages necessary for the treatment of urinary infections were much smaller than those used in the treatment of blood stream infections. To infants he gave from five to seven grains of "Prontosil" every twenty-four hours, and to children of ten to twelve years fifteen to twenty-five grains every twenty-four hours. Because its bactericidal effect was greater in alkaline urine, this drug could be used in conjunction with alkalis in the acute stages of urinary infections, and was of great value in the treatment of infections associated with a strongly alkaline urine, such as those caused by *Bacillus proteus ammoniæ*.

Dr. Dods said that some two or three years earlier Dr. Laidley had drawn his attention to a syndrome which occurred in girls usually between two and seven years of age and which was characterized by pyuria, slight frequency and dysuria, and possibly some nocturnal enuresis. Many of these children had received various forms of treatment without any success. In examination of these patients Dr. Laidley had found that the cystoscope seemed to meet with a little more resistance than usual, because of a tight sphincter muscle. The bladder wall showed early trabeculation, but the ureteral orifices were not patulous or pouting, and there was no residual urine. The majority of these children made a complete clinical recovery after dilatation of the sphincter, but unfortunately some of them failed to show any response to this form of treatment. The syndrome was not a rare one, as Dr. Laidley had seen more than forty cases of this type. As the outlook was very depressing for those children who failed to respond to dilatation, Dr. Dods wondered whether anything surgical could be done for them; whether, for example, the sphincter might be divided through the vaginal wall.

DR. D. G. MAITLAND said he was interested, from the X ray point of view, at the mention by Dr. Stephen of *spina bifida occulta*. This was not an uncommon finding in public hospitals on examination of the lumbar spine of children who were disturbed by nocturnal enuresis. He thought the slides and the paper presented by Dr. Dixon Hughes were very interesting. Dr. Maitland had come across very many interesting cases at the Women's Hospital, Crown Street, and one point in connexion with pyelitis of pregnancy, particularly in right-sided pyelitis, was that, although there was gross dilatation of the renal pelvis prior to delivery, yet three months after delivery there was an extraordinary reduction in size and an approach to normal action in the upper urinary tract. In many cases there was only a slight delay in excretion of "Uroselectan". It was strange that such gross dilatation of the upper urinary tract should have power to return to normal after the termination of pregnancy.

DR. W. C. PETHERBRIDGE referred to the term pyelitis. He wondered why, as particulars could be obtained only from the urologist, pyuria was not used. In diagnosis there was always a risk of overlooking cases, and in anxiety not to overlook them one had a tendency to diagnose pyelitis or urinary infection in obscure fever attacks. Quite a lot had their cause in the naso-pharynx and the middle ear; diagnosis had to go very deeply to discover the focus. Sometimes the focus was more potent for ill than the treatment was for good. Dr. Petherbridge said that patients were sent home because they were becoming too "hospitalized"; this was a danger, especially in infants. Quite often, as when the child was under two years of age, he suspended alkalis and treatment when the child went home, and relied on good hygiene and sunshine. Dr. Petherbridge quoted the case of a child who had been kept in hospital for five months and was then sent home, the mother keeping up the alkaline treatment regularly. The child was in a very bad condition. The doctor then stopped all urinary treatment and concentrated on sunshine and hygiene. The child made a dramatic recovery. It was all a question of vitamins. These children were ill, they would not eat, and they suffered from a lack of vitamins. The effect of vitamins on the mucous membranes was known, and this referred also to the urinary tract. Dr. Petherbridge concluded by urging that vitamins be pushed.

DR. JOHN CHESTERMAN reminded members that Dr. Stephen had said that pyelitis implied pyelonephritis, and he wondered whether the nephritic element would leave permanent damage in the kidney and whether renal

efficiency was impaired in later life. With regard to pyelitis of pregnancy, Dugal Baird, of Glasgow, had shown that hydronephrosis and hydroureter occurred in about 80% of *primigravidæ* during pregnancy, yet the majority of these women did not develop pyelitis. Dr. Chesterman wondered what was the deciding causal factor. Baird had suggested that the administration of violent purgatives and aperients might act as a cause by altering the permeability of the intestinal mucosa and allowing the *Bacillus coli communis* to enter the blood stream. Baird had noticed that sequence of events in more than one instance. With regard to sulphanilamide, Dr. Chesterman wondered whether they were not unnecessarily timid about it. He had seen it given in large doses to fifty women suffering from puerperal streptococcal infections, and none had suffered any apparent damage. Many had cyanosis, due to sulphæmoglobinæmia, but it disappeared soon after administration of the drug was stopped. There was no need to be frightened to give the smaller doses required for the treatment of pyelitis when indicated.

Dr. Keith Kirkland said the treatment of pyelitis should be better at the present time than ever before. Several advances had been made that must not be lost sight of in attacking the problem. The first of these was intravenous urography, the second was mandelic acid therapy, and the third sulphanilamide. Intravenous urography caused no damage, and in most cases would reveal any mechanical factor that should preclude medical treatment alone. For that reason, in a suspected case of pyelitis the preparation of a urogram should never be deferred. With regard to the drugs he had mentioned, Dr. Kirkland said that the infecting organism was of very great importance. With mandelic acid therapy the pH content had of course to be low if the treatment was to be efficacious. Sulphanilamide had proved of great assistance in dealing with some infections of the urinary tract, notably by the *Bacillus proteus*, and in that case there was no need to render the urine acid.

Dr. Stephen, in reply, thanked those who had taken part in the discussion.

In reply to Dr. Worrall's question regarding the symptoms suggestive of pyelitis in very young children, Dr. Stephen said that a high temperature with vomiting which proved persistent was very suggestive, even if frequency and scalding had not been noted. He considered it so important to settle the diagnosis and treatment that he did not hesitate to have specimens collected forthwith, either by catheter or by the use of very small bird seed containers, which could be adjusted over the external genitals and kept in position by the napkin. In the young male a test tube was attached to the penis with strapping.

The unfavourable impression Dr. Worrall had received from Dr. Stephen's description of the little bed for avoiding contamination of the external genitals would have been removed if Dr. Worrall had seen it in use. It was hardly appropriate to use it now, when the ascending route of infection was discredited in favour of the blood-borne infection.

Dr. Petherbridge had made reference to the effect of hospitalization. Certain cases of pyelitis that dragged on proved a very good instance of the occurrence.

Dr. Chesterman had inquired whether there had been impairment of renal efficiency. Amongst them he had found records of two cases which had been referred to the urologist in which there was evidence of renal inefficiency. In the rest of the series that he had discussed investigation had often been made, but not even a temporary defect had been recorded.

Dr. Kirkland had asked for particulars of the bacteriology of his patients. The *Bacillus coli communis* and the *Bacillus proteus* were the only causal organisms seen in these children, and the proteus infection was present in not more than four instances. The officers of the pathological department had assured him that this was the usual experience as far as the work at the Children's Hospital was concerned. His experience at the hospital made him very conscious of the claim of urography at a date not to be delayed without a reason, and he much appreciated the admirable results achieved by the urologist, as in the series Dr. Lorimer Dods had mentioned.

He was very glad Dr. Maitland had made special reference to *spina bifida occulta*. It could bring much discredit on a practitioner who had neglected to have this investigation made.

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A meeting of the Victorian Branch of the British Medical Association was held at Geelong on July 10, 1937, Professor R. Marshall Allan, the President, in the chair. Part of the report of this meeting was published in the issue of January 22, 1938, at page 174.

### Thrombo-Anglitis Obliterans.

Dr. Reginald Hooper showed a male patient, aged thirty-five years, a labourer, born in Scotland, who had sought medical advice on March 20, 1936, because of a painful toe. For five years he had suffered form cold and painful feet. The condition had affected the left foot more severely than the right, and during the past few months the pain had been aggravated by the presence of an ingrowing toe-nail, around which some low grade inflammation was present. The patient had been forced to stop working because of the severity of the pain in the foot, which appeared to be worse after exertion. Though cramp-like pains in the calves had occurred, there had never been any definite intermittent claudication. The foot had frequently been painful during the night and ease had been obtained by hanging the foot over the end of the bed.

On examination of the patient at that time no abnormality was discovered in the chest or abdomen, and the urine was normal. The blood pressure was taken on both arms, the systolic pressure being 135 and the diastolic pressure 100 millimetres of mercury. Very little departure from the normal could be discovered on examination of the upper extremities, but on examination of the legs a number of abnormal changes were detected. The right foot was fairly normal in appearance, though a faint tinge of cyanosis was noted. The popliteal and posterior tibial pulses were readily palpable. No recordings of skin temperature were possible, but on palpation it was apparent that the skin temperature of the right foot was greater than that of the left. The left foot, distal to the ankle, had a turgid cyanotic appearance, and the big toe was greyish-purple in colour. The toe-nail was cut badly and a sero-purulent discharge was present around the nail folds. Pulsation could be felt in the popliteal artery but not in the posterior tibial artery, and no capillary pulsation was obtained. Dr. Hooper said that at this stage very definite postural changes were demonstrable. Elevation of the limb produced a dead white colour of the foot, and subsequent depression of the limb was followed by vaso-dilatation. The skin colour changed to a reddish, cyanotic appearance, and typical erythralgic pain was felt by the patient. On both sides the calf muscles were poorly developed. There was a difference of two and a half centimetres in the greatest circumference of the legs, the left side being more wasted than the right. Dr. Hooper said that the treatment instituted at that stage was along general lines, and comprised care of the feet, application of heat to the affected area, abstention from tobacco and alcohol, the use of warmer socks and boots, and the practice of Buerger's exercises.

He went on to say that by April 11 the infection around the nail had improved, but the left foot had become dead white, with a thickened patch at the tip of the great toe. A week later he carried out infiltration of the common peroneal nerves of each leg at the level of the neck of the fibula. As it was not possible to record changes in skin temperature, he had to content himself with observing the changes in colour and judging the increase in temperature by feeling the legs and feet. A distinct flush was obtained up to the level of the ankle on each side, and the feet felt warmer and no longer showed the degree of postural change previously observed. On April 28 he commenced a course of intravenous injections of hypertonic saline solution, using 300 cubic centi-

metres of 5% saline solution on alternate days. These injections had produced a transient increase in the blood flow to the feet, probably attributable to the increase in blood volume. The onychial infection had persisted and seemed to Dr. Hooper to be extending. The persistence of severe pain at night and the amount of disturbance of sleep were additional indications to him of the deterioration in the general condition of the patient.

On May 14 the patient was admitted to the Colac Hospital on account of the rapid development of gangrene in the great toe, accompanied by much œdematous swelling of the foot. The toe had been very painful and the patient had been unable to sleep for several days. Dr. Hooper said that he performed interlumbosacral sympathectomy on May 15 and observed an increased flush over the foot immediately after the operation. Twelve hours afterwards vaso-dilatation of the left foot and leg was apparent and the œdema had subsided to a great extent. On the following day there was much less pain in the foot, the œdema was less and the area of gangrene had not extended. The flush on the leg and foot was not quite so definite. This improvement continued, with complete relief from pain except when the foot was elevated or was dressed with methylated spirits.

On June 8, when the gangrene had dried up, Dr. Hooper amputated the great toe, using spinal anæsthesia. The incisions had extended to within half a centimetre of the line of demarcation; there was only slight oozing from the wound, though the vessels were not ligated; the stump was closed by lateral and plantar flaps and the wound healed slowly but satisfactorily. The patient was able to walk comfortably two weeks after the operation. Three months later he had resumed work and had suffered very little disability. Dr. Hooper was interested to notice that the toe-nails had resumed the normal rate of growth, whereas previously they had rarely required cutting.

At the time of the meeting the left foot was in the satisfactory state described, but the right foot was in a condition similar to that of the left foot a year earlier. Although there was pulsation in the posterior tibial artery, the great toe frequently became a dusky grey colour, and it was evident that an increase in the blood supply was necessary to avert the onset of gangrene.

Dr. Hooper then discussed the symptomatology, pathology and treatment of *thrombo-angiitis obliterans* in relation to the patient he had shown. He said that pain was the main feature of the disease and was usually of two different types, aching erythralgia and the pain of intermittent claudication. The latter had not been a feature in his patient, but it was noteworthy that pain was sometimes felt in the *quadriceps femoris* when the patient was pedalling a bicycle, and that this muscle was worked hardest in that type of exertion. In the disease under discussion the skin colour varied, pallor being the rule, frequently with a tinge of cyanosis, but in the presence of low grade infection there was vaso-dilatation with resultant turgid red cyanosis. The postural changes characteristic of the disease were not quite so evident in his patient's feet as they had been in the earlier stages. On elevation of the limb the blood gradually drained away, leaving a dead white pallor, and subsequent depression of the limb brought about a change to a deep reddish colour, which was accompanied by intense pain. Muscular wasting was a natural concomitant of diminishing blood supply, and was increased when the patient was unable to work. Gangrene occurred frequently and was to be considered as almost inevitable.

With reference to the pathology of the disease, Dr. Hooper said that young adults and almost exclusively male subjects were affected; the disease attacked both arteries and veins, and both large and small vessels. There was neither atheroma nor calcification in the characteristic lesions in the arteries, but within a relatively intact elastic lamina great masses of organized tissue formed, filling a large part of the lumen. Chronic inflammatory changes were seen in the outer coats of the vessels and in the adventitia, and this process might also involve the adjacent veins and nerves. Transient attacks of phlebitis were encountered frequently in the superficial veins. Dr. Hooper said that changes in the blood were not frequently described. Polycythæmia was usually present, and was exemplified by the erythrocyte count of 6,740,000 cells per cubic millimetre in his patient. The relationship between the increase in the number of red cells and the viscosity of the blood and the pathogenesis of the disease was not properly understood.

In summarizing the treatment Dr. Hooper said that as so little was known of the ætiology, the treatment was mainly concentrated on an endeavour to thwart the progress of the condition by increasing the calibre of the vessels as fast as the disease process narrowed them. Treatment should begin as soon as it was realized that the circulation was defective. He quoted Lewis's dictum that the patient should cultivate the habit of treating the feet almost as though they were made of porcelain. General cleanliness of the skin and care of the toe-nails were essential, and the feet were on all occasions to be kept warm and dry. Symptomatic treatment was often necessary for abrasions and infections as well as for pain.

Dr. Hooper referred to a number of different ways in which vaso-dilatation could be increased. Reflex vaso-dilatation was effected by warming the trunk, and injection of "T.A.B." vaccine caused a reaction which produced a similar effect. The use of vaso-dilator substances had proved disappointing. The nitrites, acetylcholine and various tissue extracts had been used, but their action was too fleeting to be of any avail. The injection of hypertonic saline solution was a somewhat laborious way of obtaining the same effect, though it was possible that a great part of the benefit of this procedure could be accounted for by the dilution of the blood and the consequent reduction in viscosity and in the concentration of the red cells. Suction and venous compression methods were being used recently quite extensively in the United States of America. Apparatus to control the rhythmic suction and compression was complicated and was expensive, but apparatus for rhythmic venous compression was simpler. Both these methods were still to be considered as under trial. Vaso-dilatation could also be secured by interruption of the sympathetic pathways to the vessels of the limb, which was usually attained by one of three operative methods. Periarterial stripping of the femoral artery was a minor procedure, but the vaso-dilatation produced was not great or lasting. The other two methods were simple: transsection of the lumbar sympathetic chain and removal of the chain more or less completely. The last line of treatment was amputation, which must always be considered as an indication of failure to cope with the progress of the disease. Lewis had stressed the need for more conservatism in amputation, but if it became unavoidable, it could be undertaken with confidence below the level of occlusion of the main vessel.

Finally Dr. Hooper demonstrated by means of diagrams the different ways of interrupting the sympathetic paths to obtain vaso-dilatation, and illustrated the connexions of the sympathetic chain with the two limb plexuses and the site of section in the interlumbosacral sympathectomy. Dr. Hooper said that he had found the technique of this operation described in an article by Danielopolu, Aslan and Marcou in the *Journal de chirurgie* of 1936, the original technique apparently being due to Aurel Văleanu. The patient was placed in the Trendelenburg position and the peritoneal cavity was opened through a pubo-umbilical incision. The intestines were packed off into the upper part of the abdomen and a longitudinal incision was made in the posterior parietal peritoneum, about seven centimetres in length, parallel to the aorta and terminating at the level of the bifurcation. The peritoneum was stripped up over the psoas muscle and the sympathetic chain was isolated on the medial margin of the psoas muscle and traced upwards and downwards. When a ganglion had been identified, the cord was cut across at the level of the fourth lumbar vertebra and about one centimetre of it was resected. The abdomen was then closed *secundum artem*. Dr. Hooper said that branches from the upper portion of the chain were mainly distributed by the nerves of the lumbar plexus to the

femoral vessels. Branches from the lower portion were conveyed by the nerves of the sacral plexus to the tibial and peroneal arteries, and in this manner to the distal part of the limb. To obtain complete sympathetic denervation of the limb it was necessary either to divide the grey rami to the second, third and fourth lumbar nerves and the sympathetic trunk below the fourth lumbar ganglion, or to resect the second, third and fourth lumbar ganglia of the sympathetic chain and their connexions. These were both operations of considerable magnitude, and it was probable that the less complete denervation, obtained by cutting out those vasomotor fibres which were distributed by the nerves of the sacral plexus, was sufficient for practical purposes. This could be attained by section of the chain below the level of the fourth lumbar ganglion. It was a relatively simple operation and would produce vaso-dilatation of the limb. This was the interlumbosacral operation advised by Danielopolu *et alii*. A similar operation by a different approach was used by Trumble in Victoria. By virtue of the simplicity of this operation and the small amount of shock produced by the manipulations the operation had a wider applicability than the more drastic lumbar ganglionectomy. It could be used for patients with arteriosclerotic or diabetic gangrene, and was especially applicable in diabetic gangrene, when it would seem a reasonable risk to amputate below the knee. This optimism had hardly been justifiable hitherto, but a simple preliminary sympathectomy often made the low amputation possible.

DR. A. E. COATES congratulated Dr. Hooper on the successful way in which he had treated the patient. He said, however, that he did not agree with Dr. Hooper that interlumbosacral sympathectomy was the better operation to perform; ganglionectomy would have been a more desirable procedure. The results of investigations of those cases in which the latter operation had been performed at the Melbourne Hospital resembled those obtained at the Mayo Clinic; only about one in eight were suitable for sympathectomy. Dr. Coates regarded the thermopile as an instrument of importance in scientific investigation, but did not consider that it was indispensable for ordinary clinical purposes. Injection or division of some of the peripheral nerves, such as the posterior tibial or superficial perineal nerves, was of value for those patients who were suffering a lot of pain. He did not think that the patients got a great deal of help from compression of veins. In performing sympathectomy the surgeon should clearly understand that the arteries and larger arterioles were dilated, but not the smaller arterioles or capillaries; experimental surgery had outrun physiology and anatomy and was now contributing useful observations to both these sciences. By conservative treatment the vessels should be allowed to develop a reasonable collateral circulation. It should be remembered that the disease was one that ran a definite course. The patient's vessels would be recanalized if the limb was not destroyed in the meantime. If it was possible to temporize, many of the lesions would clear up. If it became necessary to amputate the limb, amputation should be performed below the knee. If the amputation was a good hand's breadth below the knee the man had a very useful limb. Dr. Coates considered that those patients who were coming to operation for amputation would do so in spite of sympathectomy. He also questioned Dr. Hooper's statement that nothing was known of the ætiology of the disease. There was an infective focus associated with the ætiology, and septic teeth, infected prostate and other such foci should be treated energetically. In conclusion, Dr. Coates emphasized his opinion that patients with *thrombo-angiitis obliterans* should be treated as conservatively as possible.

MR. BALCOMBE QUICK said that he had noticed recently a statement in a journal which had a bearing on the ætiology of this disease. A surgeon, while amputating a toe for gangrene in a case of Buerger's disease, pricked his finger. He contracted localized *thrombo-angiitis obliterans* in the finger, which had progressed to gangrene. Mr. Quick also stated that even in extremely debilitated patients it was well worth while to carry out section of the lumbar sympathetic chain by an extraperitoneal high muscle-splitting incision. He could assure Dr. Hooper that this procedure was not attended with any degree of shock. He would also like to sound a note of warning to Dr. Hooper about the parallelism he had drawn in the possibilities of conservative surgery in this disease on the one hand and in senile and diabetic gangrene on the other. It was because of canalization that an amputation below the knee would be successful in *thrombo-angiitis obliterans* but not in the other conditions.

DR. C. W. GALE referred to an article he had noticed in a recent number of *The British Journal of Surgery*, by Ascroft, of Middlesex Hospital, which supported the views that had been expressed by H. C. Trumble on a previous occasion. He had stated that the results of ganglionectomy were more permanent in the lower than in the upper extremity and had suggested that this might be related to the fact that in the upper limb operation the majority of the post-ganglionic fibres were divided, while in the lower limb operation they were left intact. Ascroft had experimented surgically on monkeys. If post-ganglionic section was part of the operation, vaso-dilatation did not persist; the vessels developed a tone of their own and became ten times more sensitive to adrenaline. If, on th other hand, pre-ganglionic section alone was performed, vaso-dilatation persisted and the vessels were only three times more sensitive to adrenaline. These experiments suggested the advisability of section of pre-ganglionic fibres alone in man and not of post-ganglionic fibres. In the lower extremity this could be carried out by excision of the second and third lumbar ganglia, the fourth being left intact. In the case of the upper extremity, if the cord was cut below the second thoracic ganglion, all the post-ganglionic fibres were left.

### Bilateral Trigeminal Neuralgia and Disseminated Sclerosis.

DR. KEITH ROSS showed a female patient, aged forty-nine years, who was the subject of a report published in THE MEDICAL JOURNAL OF AUSTRALIA on April 17, 1937 (page 587). After consultation, Dr. Graeme Robertson had advised him to treat the patient as if for *tic douloureux*. He had cut the sensory root on the left side, and in taking care to avoid damage to the motor root he had not cut enough; but two weeks later he had cut the sensory root on the other side quite successfully. The patient had not had any recurrence of her pain.

Dr. Ross commented on the association between trigeminal neuralgia and disseminated sclerosis. Frazier, in America, had said that he had never seen a case of this association, but Wilfred Harris had stated that he had seen thirty or forty such cases. Dr. Ross realized the interest that was taken in this subject, and said that since the publication of his recent report he had had two inquiries from America asking for further information.

DR. GRAEME ROBERTSON said that the result in this patient gave him a very great respect for Dr. Ross's surgery. In regard to the diagnosis, the patient's account of the pain was that of true trigeminal neuralgia. This condition was rarely bilateral, except in association with disseminated sclerosis. The paroxysms were excited by eating, by chewing, by putting in a denture, by cold winds, or by washing or touching the face, until life became a misery. In the patient shown by Dr. Ross the history went back five years so far as the left leg was concerned, and two years in respect of the left arm; but the patient stated that many years ago she had found difficulty in getting the left leg round when dancing a circular waltz. There appeared to be two types of history in these patients: one in which the first manifestation of the spinal lesion was the development of paraplegia between the ages of thirty-five and forty-five years, and one in which typical remissions occurred. The frequency of the association between the two conditions, trigeminal neuralgia and disseminated sclerosis, was so great as to remove it from the realm of coincidence. Two cases were reported in the literature in which there was a plaque typical of disseminated sclerosis at the entrance of the fifth sensory

root. The absence of sensory loss in such cases was of much interest and was explained by the fact that intact axones traversed the sclerotic plaques. Foerster believed that in trigeminal neuralgia the whole sensory mechanism was in a hypersensitive state, and afferent stimuli, acting as a trigger, would fire off the paroxysms of pain. Parker described a number of instances of similar pain associated with neuromata of the eighth cranial nerve. He also referred to the occurrence of typical trigeminal neuralgia and facial spasm in a rare case of his, in which the clinical diagnosis of meningeal adhesions had been made. Dr. Coates had explored the posterior fossa and exposed meningeal adhesions, which were divided. After an attack of herpes the patient had been free of pain in the area of distribution of the trigeminal nerve, and the facial spasm had ceased. Wilfred Harris had advised bilateral injection of the nerves in cases of spastic paraplegia with trigeminal neuralgia; but if the motor root was damaged on each side the patient was unable to chew properly. No doubt the procedure was safe when carried out skilfully by such a master as Harris. Partial section by open operation, expertly done, as in Dr. Ross's case, was to be preferred to injection. Dr. Robertson had, however, seen an old paraplegic soldier who had not got relief by division of the sensory root.

Dr. Coates congratulated Dr. Ross on the result obtained. Frazier himself could not have improved on it, and the patient did not have any interference with mastication. Section of the sensory root was open to the same objection as injection of the nerve. The operations were not foolproof. In operations on the Gasserian ganglion the facial nerve was in danger and a spreading neuritis could be set up if it was damaged. The case presented by Dr. Ross was an excellent one. The operations were full of traps and difficulties, but they had been carried to a conclusion which reflected great credit on the surgeon.

*(To be continued.)*

## NOMINATIONS AND ELECTIONS.

The undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Armstrong, Kenneth Charles, M.B., B.S., 1936 (Univ. Sydney), 26, Clanalpine Street, Mosman.

Rice, Charles George, M.B., B.S., 1938 (Univ. Sydney), Canterbury District Hospital, Campsie.

Taylor, Sylvia Isabel, M.B., B.S., 1938 (Univ. Sydney), Royal North Shore Hospital, St. Leonards.

The undermentioned have applied for election as members of the Victorian Branch of the British Medical Association:

Cole, John Bazil, L.R.C.P. and S., 1928 (Univ. Edinburgh), 78, Reid Street, Wangaratta.

Horan, Joseph Anthony, M.B., B.S., 1935 (Univ. Sydney), Saint Vincent's Hospital, Fitzroy, Melbourne.

# Post-Graduate Work.

## THE NEW SOUTH WALES POST-GRADUATE COMMITTEE IN MEDICINE.

### Revision Course in Sydney.

### Railway Concession Tickets.

The New South Wales Post-Graduate Committee in Medicine announces that railway concession tickets will be available for the general revision course to be held from April 4 to 14, 1938. Special rates will apply within the State of New South Wales. Return tickets will be issued for single fare for the double journey, provided not less than six travel. For interstate travellers tickets will be issued for single fare *plus* one-third for the double journey, provided that not less than six travel from the State. From South Australia and Western Australia, however, the number required will be three. Concession fares will be granted also to wives accompanying husbands, husbands accompanying wives, sons under sixteen years of age, and daughters. In the event of the required number not applying for these concessions, refund of the amount allowed will be required.

### Demonstrations in Gastroscopy.

A lecture on gastroscopy and a series of demonstrations will be given by Dr. J. C. Horan, of Melbourne, at the Prince Henry Hospital, Sydney, during the week beginning April 4, 1938. The lecture will be given at 2 p.m. on Tuesday, April 5, and the demonstrations on the other days of the week.

The number attending any one of these demonstrations will be limited to four. The fee for attendance at a demonstration will be 10s. 6d. Payment of this fee will permit attendance also at the lecture on April 5. Lists will be closed as soon as the required number of applications have been received. Application, enclosing cheque, should be made to the Secretary, the New South Wales Post-Graduate Committee in Medicine, The University of Sydney.

### Opening of the Post-Graduate School at the Prince Henry Hospital.

The Post-Graduate School at the Prince Henry Hospital will be opened by His Excellency the Governor of New South Wales, Lord Wakehurst, at 3.30 p.m. on Tuesday, April 5, 1938. The ceremony will take place in the grounds of the Prince Henry Hospital. All medical men and their wives are invited to attend.

### Social Function.

A late afternoon social function will be held at 5.30 p.m. on Tuesday, April 5, 1938, at the Australia Hotel. This function will be open to all members of the medical profession eligible to attend post-graduate instruction. A limited number of invitations will be allowed. Tickets to attend this function will be 6s. 6d. Application to attend, giving names and addresses of persons to whom it is desired invitations should be sent, should be made to Dr. Wilfred Vickers, 225, Macquarie Street, Sydney.

### Post-Graduate Golf Cup.

The match this year for the Post-Graduate Golf Cup will take place on Tuesday, April 12, 1938, at the Australian Golf Club, Rosebery. Applications to compete, stating the lowest handicap and the name of partner, if any, with whom it is desired to play, should be made to Dr. R. J. Silverton, 135, Macquarie Street, Sydney, on or before April 8. The entrance fee is 5s.

# The Royal Australasian College of Surgeons.

## GEORGE ADLINGTON SYME RESEARCH SCHOLAR, 1938.

The Council of the Royal Australasian College of Surgeons invites applications for the George Adlington Syme Research Scholarship for 1938. The scholarship is valued at £50. Applicants are requested to give details of the research work which they desire to undertake and they are informed that this work should be clinical in

type. The successful applicant must undertake to present the result of his research at any meeting of the college to which he might be invited by the council for that purpose, but not earlier than the twelfth annual general meeting, to be held early in 1939. He must also undertake to publish in *The Australian and New Zealand Journal of Surgery* a paper recording the result of his work, should the council desire him to do so.

Any further information required may be obtained from the secretary of the college, Spring Street, Melbourne, C.1, with whom applications must be lodged on or before April 30, 1938.

# Public Health.

## LEPROSY.

A PROCLAMATION has been issued in the *Government Gazette* of New South Wales of February 25, 1938, declaring leprosy to be an infectious disease within the meaning and for the purposes of the *Public Health Act*, 1902.

# Correspondence.

## THE PAYMENT OF MEDICAL FEES BY MEDICAL PRACTITIONERS.

SIR: The settlement of obligations for professional services as between doctors is one upon which there should be some definite rule.

Recently I had occasion to be attended to by several of my colleagues. Finally the removal of my gall-bladder and appendix restored me to health. I decided that the fairest way to settle my indebtedness was to pay the radiologist, the surgeon, the assistant surgeon, and the anæsthetist intermediate fees. In each case the fee was accepted, so we were all happy.

I was not insured against illness and I was not anxious to get rid of money, for being ill is an expensive business; but I do think that the men who look after us with special care when we are ill are entitled to adequate payment for services rendered. The man who attends to us may graciously say that it is "an honour to be asked", but we cannot let it go at that. After he has attended to us it is not right to send him several patients with the tacit assumption that the fees from them shall be such as to cover our own medical expenses. That is unfair to our patients. Would it not be more straightforward if each doctor were to send to his medical attendant a cheque for the amount of the intermediate fee prescribed for the particular service? Money is acceptable to us all, whereas small gifts often duplicate what we already possess.

This problem was presented to me when my wife was attended three times by the same obstetrician, a specialist who has attended many a doctor's wife. Each time, in a roundabout way I tried to discover what he needed in the way of a gift which would cost as much as his fee to an ordinary patient. I learnt that the unfortunate man's home was "cluttered up with crystal".

Surely a more equitable and generally satisfactory way of settling our debts to our colleagues is to send them a cheque for the intermediate fees. I would suggest that if the recipient of the cheque still feels that he would prefer not to accept payment he should endorse the cheque and send it to the secretary of the Medical Benevolent Fund and notify his former patient accordingly. This fund is a most deserving one, but unfortunately it receives scant support.

Yours, etc.,

February 21, 1938. "FAIR DEAL."

## TENNIS ELBOW.

SIR: I was very interested to read Dr. West's article on tennis elbow. In stating, however, that the pathology of this condition is a periostitis of the external epicondyle I feel that he is accounting for only a section of these cases.

In two cases I have seen this summer there was no sign of an epicondylalgia. In both the pain was in the front of the forearm and pronation the painful movement. May not the term "tennis elbow" include many different injuries to the elbow of varying pathology?

Yours, etc.,

271, Cambridge Street, Wembley, Perth. F. W. SIMPSON.

February 26, 1938.

## POLIOMYELITIS IN TWINS.

SIR: In contributing to the symposium on poliomyelitis in Melbourne on December 15, 1937, I stated, as reported in your journal of February 26, 1938, page 402, that the children and contacts observed in Melbourne city included four sets of twins, three homologous, in which one twin had the disease and the other escaped.

Subsequent investigation makes it doubtful if the three pairs of twins so reported are really homologus, though they are of the same sex. Verification of the relationship is delayed by the fact that the patients are now scattered in various after-care institutions, but will be carried out and reported later.

The matter seems to me to be of great interest, since the occurrence of well-marked symptoms and paralysis in one only of a pair of homologous twins, both of whom must inevitably have been exposed to infection, would, I think, be very strong evidence against the influence of heredity as a major factor in determining whether a susceptible person on exposure to infection suffers recognizable disease or joins that fortunate majority who presumably become immunized without damage.

Yours, etc.,

JOHN DALE, Medical Officer of Health.

Town Hall, Melbourne, March 1, 1938.

# Obituary.

## ARCHIBALD JAMIESON DUNN.

WE regret to announce the death of Dr. Archibald Jamieson Dunn, which occurred on March 5, 1938, at Ashfield, New South Wales.

# Proceedings of the Australian Medical Boards.

## TASMANIA.

THE undermentioned have been registered, pursuant to the provisions of the *Medical Act*, 1918, of Tasmania, as duly qualified medical practitioners:

Gray, William Robert Sutherland, M.B., B.S., 1921 (Univ. Melbourne), Westbury.

Braithwaite, Peter, M.B., B.S., 1937 (Univ. Sydney), Royal Hobart Hospital, Hobart.

Moore, Henry Dendy, M.B., B.S., 1937 (Univ. Sydney), Royal Hobart Hospital, Hobart.

Beresford, Thomas John, M.B., B.S., 1936 (Univ. Melbourne), Royal Hobart Hospital, Hobart.

## Books Received.

THE INFANT: A HANDBOOK OF MODERN TREATMENT, by E. Pritchard, M.A., M.D., F.R.C.P.; 1938. London: Edward Arnold and Company. Demy 8vo, pp. 753, with illustrations. Price: 18s. net.

THE TRUTH ABOUT CHILDBIRTH: LAY LIGHT ON MATERNAL MORBIDITY AND MORTALITY, by A. M. Ludovici; 1938. London: Kegan, Paul, Trench, Trubner and Company Limited. Demy 8vo, pp. 109. Price: 10s. 6d. net.

THE RHEUMATIC DISEASES: A COURSE OF LECTURES ARRANGED BY THE STAFF OF THE ST. JOHN CLINIC AND INSTITUTE OF PHYSICAL MEDICINE, edited by Sir L. Hill, M.B., LL.D., F.R.S., and P. Ellman, M.D., M.R.C.P., with a foreword by Sir A. MacNalty, K.C.B., M.D., F.R.C.P.; 1938. London: Edward Arnold and Company. Demy 8vo, pp. 282, with illustrations. Price: 10s. 6d. net.

DISEASES OF WOMEN, by Ten Teachers, under the direction of C. White, M.D., B.S., F.R.C.P., F.R.C.S., F.C.O.G., edited by Sir Comyns Berkeley, C. White and F. Cook; Sixth Edition; 1938. London: Edward Arnold and Company. Medium 8vo, pp. 504, with illustrations, of which many are in colour. Price: 18s. net.

MEDICAL BACTERIOLOGY, DESCRIPTIVE AND APPLIED, INCLUDING HELMINTHOLOGY, by L. E. H. Whitby, C.V.O., M.A., M.D., F.R.C.P., D.P.H.; Third Edition; 1938. London: J. and A. Churchill Limited. Large crown 8vo, pp. 381, with 79 illustrations. Price: 11s. 6d. net.

A MONOGRAPH ON VEINS, by K. J. Franklin, D.M., M.R.C.P.; 1938. London: Baillière, Tindall and Cox. Super royal 8vo, pp. 432, with illustrations. Price: 27s. net.

THE AUSTRALIAN MOTHERCRAFT BOOK, by Various Authors; 1938. Adelaide: The Mothers and Babies' Health Association of South Australia. Crown 8vo, pp. 184, with illustrations. Price: 2s. 6d. net.

NEUROLOGY, by R. D. Grinker, M.D.; Second Edition; 1938. London: Baillière, Tindall and Cox. Crown 4to, pp. 1010, with illustrations. Price: 38s. net.

## Diary for the Month.

MAR. 15.—New South Wales Branch, B.M.A.: Ethics Committee and Medical Politics Committee.
MAR. 16.—Western Australian Branch, B.M.A.: Branch.
MAR. 22.—New South Wales Branch, B.M.A.: Council (Quarterly).
MAR. 23.—Victorian Branch, B.M.A.: Council.
MAR. 24.—South Australian Branch, B.M.A.: Branch.
MAR. 24.—New South Wales Branch, B.M.A.: Annual Meeting.
MAR. 25.—Queensland Branch, B.M.A.: Council.
MAR. 29.—New South Wales Branch, B.M.A.: Council (Election of Officers and Standing Committees).
APR. 1.—Queensland Branch, B.M.A.: Branch.
APR. 5.—New South Wales Branch, B.M.A.: Organization and Science Committee.
APR. 6.—Victorian Branch, B.M.A.: Branch.
APR. 6.—Western Australian Branch, B.M.A.: Council.
APR. 7.—South Australian Branch, B.M.A.: Council.
APR. 8.—Queensland Branch, B.M.A.: Council.
APR. 12.—New South Wales Branch, B.M.A.: Executive and Finance Committee.

## Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser", pages xviii and xix.

BRISBANE AND SOUTH COAST HOSPITALS BOARD, QUEENSLAND: Medical Superintendent, Honorary Officers.

## Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment referred to in the following table without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

| BRANCHES. | APPOINTMENTS. |
|---|---|
| NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney. | Australian Natives' Association.<br>Ashfield and District United Friendly Societies' Dispensary.<br>Balmain United Friendly Societies' Dispensary.<br>Leichhardt and Petersham United Friendly Societies' Dispensary.<br>Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney.<br>North Sydney Friendly Societies' Dispensary Limited.<br>People's Prudential Assurance Company Limited.<br>Phœnix Mutual Provident Society. |
| VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne. | All Institutes or Medical Dispensaries.<br>Australian Prudential Association, Proprietary, Limited.<br>Mutual National Provident Club.<br>National Provident Association.<br>Hospital or other appointments outside Victoria. |
| QUEENSLAND: Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17. | Brisbane Associate Friendly Societies' Medical Institute.<br>Proserpine District Hospital.<br>Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL are advised, in their own interests, to submit a copy of their Agreement to the Council before signing. |
| SOUTH AUSTRALIAN: Secretary, 178, North Terrace, Adelaide. | All Lodge appointments in South Australia.<br>All contract Practice Appointments in South Australia. |
| WESTERN AUSTRALIAN: Honorary Secretary, 205, Saint George's Terrace, Perth. | All Contract Practice Appointments in Western Australia. |

## Editorial Notices.

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